DEPARTMENT : POLLUTION CONTROL AGENCY

STATE OF MINNESOTA

Office Memorandum

DATE : May 20, 1991

TO : All Site Response Section Staff
All Solid Waste Section Staff
Superfund Attorney Generals
Kathy Carlson, Public Information Office
Ralph Pribble, Public Information Office

FROM : Rodney E. Massey, P.E.
Director
Ground Water and Solid Waste Division

PHONE : 296-7777

SUBJECT : GENERIC RFRA AND EXHIBITS A AND B

Attached for your information and future reference is the final generic Request for Response Action (RFRA) and Exhibits A and B (dated May 6, 1991) that many of you have worked or commented upon over the last few months.

Special thanks goes to Brenda Winkler, Todd Goeks and Kristin Nelson for their outstanding effort to pull the attached together.

I encourage each of you to become infinitely familiar with these generic documents, especially with regard to Part IV. of Exhibit A, Commissioner Actions, wherein the Minnesota Pollution Control Agency (MPCA) establishes response action objectives and cleanup levels and the procedure for selection of a site remedy is well articulated.

In addition, I would like to emphasize the following points:

1) These are GENERIC examples of a RFRA and exhibits. While these examples should be used as a starting point for future RFRAs or Consent Orders, the final documents must be tailored to the circumstances associated with specific sites. For instance if there is no probable surface water impact from a site, do not include surface water investigation in the scope of Remedial Investigation (RI) activities.

2) The timetable for completing the requested actions laid out in the generic RFRA represents what should be a doable schedule to start and finish a Responsible Party (RP) Superfund site cleanup. This represents a generic schedule that must be lengthened or shortened depending upon site specific circumstances.

3) Note that the Minnesota approach to setting ground water cleanup levels is an attachment to Exhibit A. In addition, once the Minnesota approach to soil cleanup level setting is finalized, that document will also become an attachment. By providing our cleanup level guidance to RPs early on in the cleanup process, we hopefully will focus the RPs on cleanup alternatives as opposed to protracted study.

Note also that under Party IV.A. of Exhibit A it is the MPCA's obligation to set the site specific response action objectives and media cleanup levels no later than the approval of the RI Report. In most instances we should set the cleanup levels very early on in the RI phase. Further direction regarding conveying the site specific objectives and cleanup levels to RPs will be coming shortly.

4) The generic Exhibit A provides fairly detailed direction for the conduct of the required baseline risk assessment. As we know, the emphasis during the conduct of the risk assessment should be on determining the long-term ecological risk presented by the site.

Hopefully in six to nine months the Office of Environmental Analysis will have produced, through a contractor, a Minnesota guidance manual for the conduct of ecological risk assessments. In the meantime, RPs are required under Exhibit A to perform both the human health and ecological assessments in accordance with the specified, existing EPA guidance.

5) With regard to the differences between the EPA/NCP nine criteria approach to remedy selection and our four criteria approach, for NPL sites we should select the remedy using our four criteria and write the Record of Decision (ROD) (if EPA is concurring) using the EPA ROD guidance/nine criteria approach. I realize this may present some ROD drafting problems but the end result in terms of the important part, i.e., selecting the right remedy, will usually come out the same using either one of the sets of selection criteria.

Also be aware that, EPA is in the process of reviewing the NCP remedy selection process in light of the Clean Sites Inc. study and report, and future bets are that EPA will be revising the NCP remedy selection process to closely align with our process as articulated in Exhibit A.

For all other non-NPL PLP sites we should use our selection criteria and prepare the ROD to reflect our criteria.

Please begin using this generic RFRA and Exhibits for all future RFRAs and Consent Orders, again keeping in mind that the generic must be tailored to site specific circumstances.

Finally, Todd and Brenda have agreed to conduct informal training sessions on use of the documents during future Unit meetings.

If you have questions see your supervisor.

REM:nml

cc: John Holck, Ground Water and Solid Waste Div., Program Development Section
Dave Belluck, Environmental Analysis Office
Betsy Gerbec, Minnesota Department of Health
Paul Liemandt, Minnesota Department of Agriculture
Michael Kanner, Hazardous Waste Division, Tanks and Spills Section

May 20, 1991

Generic RFRA and Exhibits

This package includes the generic RFRA and Exhibits. The generic Exhibits should also be utilized in conjunction with development of Consent Orders. Any statements contained in square brackets "[ ]" are for the project team's consideration. Any section that does not apply to your site may be deleted. If information not specified is needed for your site, request that information in the appropriate section.

Site Response Section clerical staff has installed the attached generic documents in WPS-PLUS. The clericals will prepare the first draft RFRAs and Exhibits only from a hard copy generic prepared by the site team for the specific site.

A supply of the generic documents is located in the Site Response Section forms file.

STATE OF MINNESOTA

COUNTY OF RAMSEY

In the Matter of the
[**Site Name**]
[**City, County**], Minnesota

MINNESOTA POLLUTION

CONTROL AGENCY

REQUEST FOR

RESPONSE ACTION

To: [**Name of RP**]

I. NOTIFICATION OF OBLIGATION TO TAKE RESPONSE ACTION

A. This document is issued by the Minnesota Pollution Control Agency (MPCA) and constitutes a Request for Response Action (RFRA), as authorized by Minn. Stat. §§ 115B.17 and 115B.18.

B. YOU ARE HEREBY NOTIFIED that the MPCA has made the following determinations:

1. The [**Site Name**] (Site), located in [**City, County**], Minnesota, constitutes a facility[1] within the meaning of Minn. Stat. § 115B.02, subd. 5(a) and (c);

2. There have been one or more releases within the meaning of Minn. Stat. § 115B.02, subd. 15 and continue to be releases and threatened releases of hazardous substances or pollutants or contaminants;

3. The substances released from the facility are hazardous substances within the meaning of Minn. Stat. § 115B.02, subds. 8, and 9;

4. The releases and threatened releases are from the facility;

5. With respect to these releases and threatened releases, [**name of RP (Abbreviated Identifier)**] is a responsible person within the meaning of Minn. Stat. § 115B.03, subd. 1(a) and subd. 3(a);

6. The actions requested in the RFRA are reasonable and necessary to protect the public health or welfare or the environment; and

7. The schedule for beginning and completing the requested actions in this RFRA is reasonable.

C. Having made these determinations, the MPCA formally requests that [**the RP**] take the response actions described in Section II of this RFRA. A timetable for beginning and completing the actions is established in Section III. The reasons for the requested actions are set out in Section IV. Section V describes the intention of the MPCA to take action if [**the RP**] fails to take the requested response action within

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1. Terms used in the RFRA and the Exhibits to the RFRA are defined in Attachment I to the RFRA.

the timetable established in Section III. Section V also describes the consequences of failure to satisfactorily respond to the RFRA. Cost reimbursement obligations are described in Section VI.

D. [**The RP**] must notify the MPCA staff by [**date (usually within 20 days of RFRA effective date)**] of its intentions to undertake the response actions requested in the RFRA. Failure by [**the RP**] to notify the MPCA staff by [**date**] of its intentions to undertake the response actions, may result in a determination by the MPCA under Minn. Stat. § 115B.17, subd. 1(a)(3) that the actions requested will not be taken in the manner and within the time requested.

Notification of the intent should be sent to [**Project Manager's Name**], Project Manager, Division of Ground Water and Solid Waste, Minnesota Pollution Control Agency, 520 Lafayette Road North, St. Paul, Minnesota, 55155, telephone number [**telephone #**].

E. If [**the RP**] does not otherwise agree to take the requested actions, the matter will be referred to the MPCA for a Determination That Actions Will Not Be Taken in the Manner and Time Requested. The MPCA, upon determining that [**the RP**] has not adequately responded, may authorize litigation to require [**the RP**] to take necessary response actions and/or reimburse the state for costs incurred if the state elects to implement response actions. These steps are described more fully in Section VI.

II. REQUESTED RESPONSE ACTIONS

The MPCA has determined (1) that the following actions constitute removal or remedial actions (response actions) within the meaning of Minn. Stat. § 115B.02, subds. 16, 17, and 18 and (2) that these response actions are reasonable and necessary to protect the public health, welfare, or the environment. Consequently, the MPCA hereby formally requests that [**the RP**] take the response actions within the timetables established in Section III.

The MPCA's purpose in issuing this RFRA is to expedite the implementation of final response actions at the Site. The criteria for determining the response actions to be implemented at the Site are specified in Part IV.C. of Exhibit A to this RFRA. These criteria shall receive foremost consideration in the development and implementation of the Remedial Investigation/Feasibility Study.

The review and approval, approval with modifications and/or a request for additional information, or rejection of all work plans, reports, or other documents (submittals) shall be in accordance with Exhibit A, Part IV.B. and Exhibit B, Part V.A.

A. Remedial Investigation and Feasibility Study

The purpose of the Remedial Investigation/Feasibility Study (RI/FS) is to provide sufficient information, through detailed evaluation of the feasibility and effectiveness of alternative response actions, to allow for the selection and implementation of response actions to remediate the release of hazardous substances or pollutants or contaminants associated with the Site. The requirements of the RI/FS are described in Exhibit A to this RFRA. Exhibit A is appended to and made an integral part of this RFRA.

B. Remedial Design and Response Action Plan and Implementation

The purpose of the Remedial Design and Response Action Plan (RD/RA Plan) is to provide a detailed design and an implementation schedule for the selected response actions which, upon implementation, will protect the public health and welfare, and the environment from the threatened and/or actual release of hazardous substances or pollutants or contaminants associated with the Site. The requirements of the RD/RA Plan and response action implementation are described in Exhibit B to this RFRA. Exhibit B is appended to and made an integral part of this RFRA.

C. Reports

Within thirty (30) calendar days of the effective date of this RFRA and monthly thereafter unless otherwise advised by the Project Manager, [**the RP**] shall submit to the MPCA Commissioner a monthly summary report detailing all activities conducted pursuant to this RFRA during the preceding month and activities planned for the next month. The report shall also include all results of sample analyses, tests and other data gathered or received by [**the RP**] after a reasonable period of review by [**the RP**]. The progress reports shall be received by the MPCA Commissioner by the fifteenth day of the following month. The progress reports shall be addressed to:

[**Name**], Project Manager
Division of Ground Water and Solid Waste
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

D. Data and Document Availability and Retention

[**The RP**] shall permit the MPCA staff and/or its authorized representatives to inspect and copy all sampling, testing, monitoring, or other data transmitted to or generated by [**the RP**] pertaining to work undertaken pursuant to this RFRA. [**The RP**] shall allow duplicate/split samples to be collected by the MPCA staff and/or its authorized representatives, of any samples collected by [**the RP**] pursuant to this RFRA. [**The RP**] shall maintain a central repository of the data, reports, and other documents prepared pursuant to this RFRA. All data, reports, and other documents shall be preserved by [**the RP**] until [**the RP**] receives written approval from the MPCA Commissioner to destroy any such documents.

III. TIMETABLE FOR COMPLETING THE REQUESTED ACTIONS

The MPCA has determined that the following timetable is necessary and reasonable. The timetable refers to specific elements of Exhibits A and B to this RFRA. Unless otherwise specified, "days" means calendar days.

Notice of Intent to Comply	[**date**]
Retain Consultant to Complete Requirements of Exhibit A	Within 30 days of effective date of the RFRA

[Include a 60 day Consent Order negotiation period if the RP indicated an interest in negotiating a Consent Order in their response to the Commissioner's Notice Letter. The negotiation period shall run concurrently with the RP preparation of the RI/FS Work Plan.]

Submit RI/FS Work Plan	Within 90 days of effective date of the RFRA
Initiate RI and Development and Screening of Response Action Alternatives	Within 30 days of Notification of MPCA Commissioner's approval of the RI/FS Work Plan
Complete RI	Within 150 days of initiating the RI
Submit RI Report	Within 60 days of completion of the RI
Submit FS Report	Within 90 days of Notification of MPCA Commissioner's approval of the RI Report
MPCA Commissioner Issues Record of Decision	
Retain Consultant to Complete Requirements of Exhibit B	Within 30 days of Commissioner's approval of the FS Report
Submit RD/RA Plan	Within 60 days of Notification of MPCA Commissioner's approval of FS Report
Initiate RA	Within 30 days of Notification of MPCA Commissioner's approval of RD/RA Plan
Report Results of RA Implementation	Within 60 days of completion of RA

[The RP] shall promptly notify the MPCA Commissioner of any anticipated or actual failure to comply with the dates or other terms of this RFRA. Such notice shall include the reasons for the noncompliance and steps proposed for a return to compliance or alternative actions proposed to comply with the intent of this RFRA. The MPCA Commissioner may accept or modify the proposed alternative actions if the Commissioner determines that such measures are adequate and that the need for the modification is not a result of failures within the control of [the RP]. The MPCA Commissioner may grant extensions of the time schedules set forth in this RFRA in the event that [the RP] demonstrates to the Commissioner good cause for granting the extension.

IV. REASONS FOR THE REQUESTED ACTION

Samples of soil and ground water at the Site and information provided by [the RP] indicate releases of hazardous substances or pollutants or contaminants from the Site. The Site meets the definition of a "facility" and is the source of these releases of hazardous substances or pollutants or contaminants.

Studies conducted to date on the extent of contamination at the Site have not yielded sufficient information to allow assessment, selection, design, and implementation of response actions to remedy the release of hazardous substances or pollutants or contaminants or to allow for assessment, selection, design, or implementation of methods to prevent additional or continued releases.

The requested actions set forth in Sections II and III will provide such additional information as is necessary to fully evaluate and allow for selection, design, and implementation of appropriate response actions to prevent additional or continued releases and to remediate the Site.

V. MPCA's INTENTION TO TAKE ACTION AND CONSEQUENCES OF RESPONSIBLE PERSON'S FAILURE TO TAKE REQUESTED ACTION

A. YOU ARE HEREBY NOTIFIED that under the Minnesota Environmental Response and Liability Act, if a responsible person fails to take the requested actions in an adequate or timely fashion, the responsible person may be subject to the following actions:

1. the MPCA may undertake or complete the requested response actions and seek reimbursement from the responsible person for all costs associated with such action; or

2. the responsible person may be subject to an action to compel performance of the requested response action or for injunctive relief to enjoin the release or threatened release.

In either case, a responsible person who fails to take the response actions requested by the MPCA in an adequate and timely fashion may be required to pay a civil penalty in an amount to be determined by the court of up to $20,000 per day for each day that the responsible person fails to take reasonable and necessary response actions.

B. YOU ARE HEREBY FURTHER NOTIFIED that under the Minnesota Water Pollution Control Act the responsible person may be subject to a civil action for injunction, reimbursement of expenses, and civil penalties.

C. YOU ARE HEREBY FURTHER NOTIFIED that if you fail to take the requested response actions, the MPCA intends to take one or more of the actions specified in A. and B. above.

VI. REQUIREMENT TO REIMBURSE THE MPCA

YOU ARE HEREBY FURTHER NOTIFIED that the responsible person, whether or not they complete the requested response action, may be required to:

A. reimburse the MPCA for all reasonable and necessary expenses it incurs, including all response costs, and administrative and legal expenses in the investigation and/or cleanup of the release; and

B. pay for any damages to the air, water, or wildlife resulting from the release of a hazardous substance, pollutant or contaminant.

Dr. Daniel Foley, Chairman

Charles W. Williams, Commissioner

Date: _____

Effective Date: _____

Minnesota Pollution Control Agency

Attachment 1
(RFRA)

DEFINITIONS

1. "**RELEASE**", is defined in Minn. Stat. § 115B.02, subd. 15 as follows:

> "Release" means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment which occurred at a point in time or which continues to occur.
>
> "Release" does not include:
>
> (a) Emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, watercraft, or pipeline pumping station engine;
>
> (b) Release of source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, under 42 United States Code § 2014, if the release is subject to requirements with respect to financial protection established by the federal Nuclear Regulatory Commission under 42 United States Code § 2210;
>
> (c) Release of a source, byproduct or special nuclear material from any processing site designated pursuant to the Uranium Mill Tailings Radiation Control Act of 1978, under 42 United States Code § 7912(a)(1) or 7942(a); or
>
> (d) Any release resulting from the application of fertilizer or agricultural or silvicultural chemicals, or disposal of emptied pesticide containers or residues from a pesticide as defined in § 18A.21, subd. 25.

2. "**FACILITY**", is defined in Minn. Stat. § 115B.02, subd. 5 as follows:

> "Facility" means:
>
> (a) Any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft;

(b) Any watercraft of any description, or other artificial contrivance used or capable of being used as a means of transportation on water; or

(c) Any site or area where a hazardous substance, or a pollutant or contaminant, has been deposited, stored, disposed of, or placed, or otherwise come to be located.

"Facility" does not include any consumer product in consumer use.

3. "**POLLUTANT OR CONTAMINANT**", is defined in Minn. Stat. § 115B.02, Subd. 13 as follows:

"Pollutant or contaminant" means any element, substance, compound, mixture, or agent, other than a hazardous substance, which after release from a facility and upon exposure of, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in the organisms or their offspring.

"Pollutant or contaminant" does not include natural gas, natural gas liquids, liquefied natural gas, synthetic gas usable for fuel, or mixtures of such synthetic gas and natural gas.

4. "**HAZARDOUS SUBSTANCE**" is defined in Minn. Stat. § 115B.02, Subd. 8 as follows:

"Hazardous substance" means:

(a) Any commercial chemical designated pursuant to the Federal Water Pollution Control Act, under 33 United States Code § 1321(b)(2)(A);

(b) Any hazardous air pollutant listed pursuant to the Clean Air Act, under 42 United States Code § 7412; and

(c) Any hazardous waste.

"Hazardous substance" does not include natural gas, natural gas liquids, liquefied natural gas, synthetic gas usable for fuel or mixtures of such synthetic gas and natural gas, nor does it include petroleum, including crude oil or any fraction thereof which is not otherwise a hazardous waste.

5. "**HAZARDOUS WASTE**" is defined in Minn. Stat. § 115B.02, Subd. 9 as follows:

> "Hazardous waste" means:
>
> (a) Any hazardous waste as defined in § 116.06, Subd. 13, and any substance identified as a hazardous waste pursuant to rules adopted by the agency under § 116.07; and
>
> (b) Any hazardous waste as defined in the Resource Conservation and Recovery Act, under 42 United States Code § 6903, which is listed or has the characteristics identified under 42 United States Code § 6921, not including any hazardous waste the regulation of which has been suspended by act of Congress.

6. "**RESPONSIBLE PERSON**" is defined in Minn. Stat. § 115B.03 as follows:

> Subd. 1. General Rule. For the purposes of §§ 115B.01, to 115B.20, and except as provided in subds. 2 and 3, a person is responsible for a release or threatened release of a hazardous substance, or a pollutant or contaminant, from a facility if the person:
>
> (a) Owned or operated the facility: (1) when the hazardous substance, or pollutant or contaminant, was placed or came to be located in or on the facility; (2) when the hazardous substance, or pollutant or contaminant, was located in or on the facility but before the release; or (3) during the time of the release or threatened release;
>
> (b) Owned or possessed the hazardous substance, or pollutant or contaminant, and arranged, by contract, agreement or otherwise, for the disposal, treatment or transport for disposal or treatment of the hazardous substance, or pollutant or contaminant; or
>
> (c) Knew or reasonably should have known that waste he accepted for transport to a disposal or treatment facility contained a hazardous substance, or pollutant or contaminant, and either selected the facility to which it was transported or disposed of it in a manner contrary to law.
>
> Subd. 2. Employees and Employers. When a person who is responsible for a release or threatened release as provided in subdivision 1 is an employee who is acting in the scope of his employment:

(a) The employee is subject to liability under § 115B.04 or 115B.05 only if his conduct with respect to the hazardous substance was negligent under circumstances in which he knew that the substance was hazardous and that his conduct, if negligent, could result in serious harm.

(b) His employer shall be considered a person responsible for the release or threatened release and is subject to liability under § 115B.04 or 115B.05 regardless of the degree of care exercised by the employee.

Subd. 3. Owner of Real Property. An owner of real property is not a person responsible for the release or threatened release of a hazardous substance from a facility in or on the property unless that person:

(a) was engaged in the business of generating, transporting, storing, treating, or disposing of a hazardous substance at the facility or disposing of waste at the facility, or knowingly permitted others to engage in such a business at the facility;

(b) knowingly permitted any person to make regular use of the facility for disposal of waste;

(c) knowingly permitted any person to use the facility for disposal of a hazardous substance;

(d) knew or reasonably should have known that a hazardous substance was located in or on the facility at the time right, title, or interest in the property was first acquired by the person and engaged in conduct by which he associated himself with the release; or

(e) took action which significantly contributed to the release after he knew or reasonably should have known that a hazardous substance was located in or on the facility.

For the purpose of clause (d), a written warranty, representation, or undertaking, which is set forth in an instrument conveying any right, title or interest in the real property and which is executed by the person conveying the right, title or interest, or which is set forth in any memorandum of any such instrument executed for the purpose of recording, is admissible as evidence of whether the person acquiring any right, title, or interest in the real property knew or reasonably should have known that a hazardous substance was located in or on the facility.

Any liability which accrues to an owner of real property under §§ 115B.01 to 115B.15 does not accrue to any other person who is not an owner of the real property merely because the other person holds some right, title, or interest in the real property.

An owner of real property on which a public utility easement is located is not a responsible person with respect to any release caused by any act or omission of the public utility which holds the easement in carrying out the specific use for which the easement was granted.

7. **CONTAMINANT(s):**

When used separately, this word means: any chemical parameter that evidences the presence of hazardous substances or pollutants or contaminants.

8. **RECORD OF DECISION (ROD):**

A ROD is a document, prepared by the lead enforcement agency, which sets forth the rationale for selecting specific response actions that will be implemented at a site or a particular operable unit at a site.

9. **CONTAMINANT SOURCE AREA:**

A discrete area from which contamination has emanated or may emanate in the future, e.g. an area of contaminated soil may be a contaminant source area for ground water contamination at a particular site.

10. **REASONABLE MAXIMUM EXPOSURE (RME):**

The RME is defined as the highest exposure that is reasonably expected to occur at a site. The intent of the RME is to estimate a conservative exposure case (i.e., well above the average case) that is still within the range of possible exposures. RMEs are estimated for individual pathways. If a population is exposed via more than one pathway, the combination of exposures across pathways must also be represented by an RME.

11. **BASELINE RISK ASSESSMENT:**

An evaluation of the actual and potential threat to public health and welfare, and the environment posed by the release(s) or threatened release(s) of hazardous substances or pollutants or contaminants, in the absence of any remedial action.

12. **OPERABLE UNIT:**

An operable unit is a discrete portion of the Site, and may be defined by geographic area, type of environmental medium or contaminant source area, or other relevant factors.

13. **APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS):**

ARARs are state or federal standards, requirements, criteria, or limitations that: 1) are legally applicable to the hazardous substances or pollutants or contaminants at the Site, or 2) are relevant and appropriate, i.e., they address circumstances sufficiently similar to those at the Site that their application is well suited in determining whether response actions are reasonable and necessary to protect the public health and welfare, or the environment.

14. **TECHNOLOGY TYPES:**

Technology types are general categories of technologies that can be applied to sites for the purpose of remediating contamination. Examples include: chemical treatment, thermal destruction, and immobilization.

15. **PROCESS OPTIONS:**

Process options are specific processes within a given technology type. For example, the chemical treatment technology type would include such process options as precipitation, ion exchange, and oxidation/reduction

16. **RESPONSE ACTION ALTERNATIVES:**

Response action alternatives are an assemblage of one or more technology types and their respective process options which, when implemented, will be protective of human health and welfare, and the environment and will likely meet the site-specific response action objectives and cleanup levels.

17. **EVALUATED ALTERNATIVE:**

An evaluated alternative is a response action alternative that has successfully passed the screening conducted during the RI. The MPCA Commissioner makes the final determination of which response action alternatives will be considered "evaluated" alternatives.

18. **MAXIMUM EXPOSURE CASE ANALYSIS:**

A maximum case exposure analysis is defined as the highest exposure that can occur at a site. This analysis will be done for scenarios that model catastrophic consequences even if their probability of occurrence is low.

EXHIBIT A
Table of Contents

Exhibit A
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

I. INTRODUCTION, PURPOSE, AND REQUIREMENTS

I.A. Introduction

Part II.A of the Request for Response Action (RFRA), to which this Exhibit is appended, requests the Responsible Party (RP) to conduct a Remedial Investigation/Feasibility Study (RI/FS) with respect to release(s) or threatened release(s) of hazardous substances or pollutants or contaminants at or from the [Site name] (Site). This Exhibit sets forth the requirements for completing the RI/FS and is appended to and made an integral part of the RFRA. Terms used in this Exhibit are defined in Attachment I to the RFRA.

I.B. Purpose

The purpose of conducting an RI/FS is to provide information necessary to enable the Minnesota Pollution Control Agency (MPCA) Commissioner to select a final remedy for the Site.

In order to arrive at remedy selection in the most expedient manner, the RI and FS activities will be conducted concurrently. The RI/FS Work Plan shall propose:

- the RI activities; and
- a list of possible technology types.

The RI Report shall:

- report the results of the RI; and
- document the development and screening of possible response action alternatives.

The FS Report shall present:

- the results of treatability studies; and
- the Detailed Analysis Report (DAR).

I.B.1. Remedial Investigation. The RI activities will (1) provide for the complete characterization of the release(s) or threatened release(s) of hazardous substances or pollutants or contaminants at or from the Site and the actual or potential hazard the release(s) or threatened release(s) pose to public health and welfare, and the environment; (2) produce sufficient data and information to allow the RP to submit the RI and FS reports (Part III.E and III.F); and (3) produce data of sufficient quantity and adequate technical content to assess the possible alternative response actions during the FS.

I.B.2. Feasibility Study. The FS activities consist of developing a list of technology types, development and screening of possible response action alternatives, preparing and conducting treatability studies, and conducting a detailed analysis of evaluated alternatives. The MPCA Commissioner will review the FS Report and select the final response action(s) using the Selection of Remedy Criteria set forth in Part IV.C. of this Exhibit.

I.C. **Requirements**

[Information contained in brackets in this section is to be used for NPL sites]. The RI/FS shall be conducted according to the provisions of this Exhibit. **[The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 CFR Part 300.430 and]** The United States Environmental Protection Agency (EPA) Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (October 1988 Interim Final) will provide the RP with specific guidance for completing the actions required under this Exhibit to the extent that this guidance **[is][and Exhibit are not inconsistent with the NCP.]** consistent with the requirements of this Exhibit. The sampling and quality assurance activities (Part III.C.3) shall be consistent with the requirements of the EPA Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (QAMS-005/80). Risk assessments (i.e., evaluation, quantitation, tabulation of results, and mechanics of presentation) performed under this Exhibit (Part III.C.6.) shall be based on appropriate MPCA requirements, U.S. EPA's "The Risk Assessment Guidelines of 1986" (EPA/600/8-87/045), "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Pt. A, December 1989, Interim Final) and the EPA Risk Assessment Guidance for Superfund, Vol. 2, Environmental Evaluation Manual (March 1989, Interim Final).

At a minimum, the Site Security and Safety Plan (Part III.C.8) shall incorporate and be consistent with the requirements of:

- OSHA requirements 29 CFR Part 1910.120, Hazardous Waste Operations and Emergency Response.
- OSHA requirements 29 CFR Part 1910 (General Industry Standards) and 1926 (Construction Industry Standards).
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/EPA, DHHS (NIOSH) Publication Number 85-115, October 1985.

As new versions or future revisions of the documents referenced in this section become available to the public, the latest version of each document shall supersede all previous versions of that document and shall be used for conducting the RI/FS.

II. **RETAIN CONSULTANT**

Within thirty (30) days of the effective date of the RFRA, the RP shall retain a consultant qualified to undertake and complete the requirements of this Exhibit and shall notify the MPCA Project Manager of the name of that consultant.

III. REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

III.A. RI/FS Objectives

The objectives of the RI/FS are to:

- identify all sources of contamination;
- evaluate the nature and extent of [**soil, surface water, ground water, and air**] contamination at the Site and in any adjacent areas affected by contamination at or from the Site;
- identify all existing and potential migration characteristics and pathways for the hazardous substances or pollutants or contaminants identified at the Site, including the direction, rate, and dispersion of contaminant migration;
- identify alternative response actions and evaluate the feasibility and effectiveness of implementing those alternative response actions to prevent, minimize, or eliminate release(s) or threatened release(s) of hazardous substances or pollutants or contaminants at or from the Site; and
- collect and evaluate the information necessary to prepare a remedial design/response action plan in accordance with Exhibit B to the RFRA.

III.B. RI/FS Work Plan Submittal

Within ninety (90) days of the effective date of the RFRA, the RP shall submit to the MPCA Commissioner for approval pursuant to Part IV.B. and IV.B.1. of this Exhibit, a proposed RI/FS Work Plan and implementation schedule which details all of the activities necessary to complete the RI/FS. The proposed RI/FS Work Plan shall be prepared to enable the RP to meet the RI/FS Objectives (Part III.A) and shall, at a minimum, address all of the elements described in the RI/FS Work Plan Contents (Part III.C.). [**The RP shall continue to implement any RI activities, previously approved by the MPCA Commissioner, which accomplish the purposes and meet the requirements of this Part.**]

III.C. RI/FS Work Plan Contents

The proposed RI/FS Work Plan shall address, at a minimum, each of the following elements:

III.C.1. Project Management. A Project Management section of the RI/FS Work Plan shall describe how the RI/FS will be managed by the RP and its contractors, subcontractors, and consultants. This section shall include an organization chart with the names and titles of key personnel and a description of their individual responsibilities.

III.C.2. Background Evaluation. The RI/FS Work Plan shall include a Background Evaluation which includes these sections: Operational History, Topographic Survey, History of Site Assessment Work and Remedial or Removal Actions, and Identification of Data Gaps.

III.C.2.a. Operational History of The Site. This section shall include a detailed explanation of the operational history of the Site (i.e., all past facilities and a description of their specific operations), including history of property ownership boundaries, and pertinent area and boundary features of the Site. In addition, this section shall include the following detailed information related to the release(s) or threatened release(s) of hazardous substances or pollutants or contaminants at the Site:

- a list of the hazardous substances or pollutants or contaminants that have been stored, used, treated, or disposed of on-Site and their estimated volumes, concentrations, and characteristics;
- a description of what, where, when, how and by whom hazardous substances or pollutants or contaminants were released during the operation of all facilities of record at the Site (e.g., Provide an explanation of how the Site or a specific area became contaminated.);
- a description of contaminant source areas and facilities which release or threaten the release of hazardous substances or pollutants or contaminants to soil, surface water, ground water, or air;
- a Site map delineating each area where such hazardous substances or pollutants or contaminants were disposed, treated, stored, transferred, handled, or used;
- a description of all industrial processes which are or were related to the use or generation of each hazardous substance or pollutant or contaminant; and
- a description of past disposal practices for hazardous substances or pollutants or contaminants.

Any historical research needs that have not been met by file review may be met by conducting employee interviews, reviews of the RP's records, and aerial photograph investigations.

III.C.2.b. Topographic Survey. This section shall include a description of the general physiography of the Site and surrounding area and one (1) Site map using a one (1) inch = 1000 feet scale and ten (10) foot contour interval.

Additional maps for each identifiable contaminant source area shall be provided using a one (1) inch = 50 feet scale and a two (2) foot contour interval. Surface water features, drainage direction, buildings, process areas, storage tanks, well locations, forested areas, utilities, paved areas, easements, rights-of-way, pipelines (surface and subsurface), landfills, borrow pits, debris piles, raw material piles, and impoundments shall be shown. The maps shall be of sufficient detail and accuracy to locate all current or proposed future work at the Site.

III.C.2.c. History of Site Assessment Work and Remedial or Removal Actions. This section shall include a history of all previous investigation(s) and response action(s) conducted at the Site including:

- a detailed description of regional and local hydrogeology and geology based on published literature and available technical information. Cross Sections and maps shall be included. Include the type and extent of surface soils as presented in the Soil Conservation Service soil surveys;
- a summary of all soil, surface water, ground water, and air assessment work completed to date, including contaminant source area identification, data reduction and interpretation, and the QA/QC procedures which were followed;
- a description of the nature and extent of the release(s) and/or threatened release(s), including a summary of actual and potential on-Site and off-Site health and/or environmental effects; and
- a summary of any previous remedial or removal actions conducted at the Site. This summary shall include cleanup activities and any related field inspections, sampling surveys, or other related technical investigations.

III.C.2.d. Identification of Data Gaps. Gaps in information (data gaps) necessary to fulfill the RI/FS Objectives (Part III.A) shall be identified and recommendations shall be made for additional RI work necessary to meet the RI/FS Objectives and produce sufficient information to support the screening and detailed analysis of response action alternatives in the RI/FS. For each data gap identified, the RP shall provide a list and description of research and field activities necessary to address that data gap.

III.C.3. Sampling and Investigations. The RI/FS Work Plan shall propose activities and methodologies necessary to conduct the investigations specified in Parts III.C.3.c, d, e and f, III.C.6. and propose the plans specified in Parts III.C.3.a and b.

III.C.3.a. Sampling and Analysis Plan. A comprehensive sampling and analysis plan shall be proposed for the investigations required under Parts III.C.3.c, d, e, and f, and III.C.6 below. This plan shall include:

- objectives of the sampling investigation;
- criteria for sampling location selection;
- a map showing all locations that will be sampled;
- a description of the types of samples which will be collected;
- a description of the depth/frequency of sampling at each location;
- a proposed sampling schedule;
- identification of all chemical parameters to be analyzed (analytes), selection rationale, and a corresponding list of chemical analytical methodologies (including EPA or Standard Method numbers and detection limits) to be performed. Prior to determining a final analyte list, analytes of concern should be separated into carcinogens and non-carcinogens. In addition, representative ground water samples shall be analyzed to identify natural chemical constituents that may effect various treatment methods or that may identify upgradient sources of contamination;
- abiotic and biotic environmental sampling shall be proposed to complete the assessment process required under Part III.C.6.

- the technical specifications and procedures for soil sampling methods, drilling methods, borehole and surface geophysical methods, and monitoring well and piezometer installations. ASTM procedures shall be used and referenced where appropriate and available;
- provisions for obtaining access to and obtaining samples from the Site and other affected properties (where appropriate);
- a description of quality assurance/quality control procedures for the collection, identification, preservation, holding times, and transportation of samples; type and volume of sample containers; the calibration and maintenance of field instruments; decontamination of sampling equipment; and the processing, verification, storage, calculations and statistics, and reporting of field data including field chain-of-custody procedures, identification of qualified persons conducting the sampling, and identification of a laboratory meeting the requirements of Part III.C.3.b.; and
- a description of any computer models to be employed in data analysis. Model descriptions shall include capabilities and limitations, all assumptions or approximations that will be made in calibrating and using the model, specific objectives to be achieved with the model, and justification for use of the model method including a discussion of why the model is the preferred model or method for meeting the objectives stated in the RI/FS Work Plan. The quantities or values that are desired from the model that are not confirmed by direct measurement shall be identified and the sensitivity of the model results to input parameters discussed. All data and programming including any proprietary programs shall be made available to the MPCA staff upon request.

III.C.3.b. Laboratory QA/QC Plan. The RI/FS Work Plan shall include a laboratory QA/QC plan which shall consist of the following sections:

- identification of laboratories performing analysis;
- description of laboratory sample chain of custody procedures;
- description of calibration procedures and frequency;
- description of analytical standard operating procedures;
- description of data reduction, validation, and reporting procedures;
- description of internal quality control checks;
- description of performance and system audits;
- description of preventative maintenance procedures;
- description of specific procedures for routine assessment of data precision, accuracy, completeness, and any necessary corrective action; and
- description of quality assurance reports to management.

III.C.3.c. Geologic Investigation. This section of the RI/FS Work Plan shall provide a description of the proposed activities which will be undertaken to characterize the geology and contaminant distribution at the Site and other affected properties. The geologic investigation shall be conducted in areas of known and suspected disposal and in areas where ground water contamination exists and no known or suspected contaminant source area has been identified. This section shall include the following:

- a proposal to define the stratigraphy of the consolidated and unconsolidated deposits including the identification of high or low permeability lenses of material in the unsaturated (vadose) zone which may affect contaminant migration or the attenuation of contaminants. This proposal shall also include the extent and type of lithologies of respective consolidated units and unconsolidated materials including relative amounts of organic matter, gravel, sand, silt, and clay according to ASTM soils classification scheme or other acceptable standard procedures;
- proposed tests to define the physical and chemical properties which affect the movement or attenuation of contaminants in the stratigraphic units identified above. These properties include: [**list desired properties e.g., density, organic matter content, cation exchange capacity, percent clay content, vertical hydraulic conductivity, total porosity, effective porosity, and adsorption potential (Kd). See the soil cleanup guidance for additional parameters.**];
- proposed methods to define the nature and extent of contamination in the vadose zone;
- a proposal to identify areas disturbed by excavations or other activities that may be routes of contaminant migration (e.g., buried pipes, utility corridors, fill areas, tank basins); and
- a proposal to identify ambient concentrations of analytes in the soil.

III.C.3.d. Hydrogeologic Investigation. This section of the proposed RI/FS Work Plan shall provide a description of activities to be undertaken to characterize the local and regional hydrogeology and the contaminant distribution in the ground water at the Site and other affected properties. This section shall include the following:

- a proposal to identify Quaternary (glacial) and bedrock aquifers, aquitards, and perched water zones;
- a proposal for the installation and development of ground water monitoring wells and/or piezometers or other devices needed to clearly define ground water flow conditions in the glacial and bedrock aquifers, aquitards, and perched water zones. All wells shall be surveyed to the National Geodetic Vertical Datum reference elevation, and procedures shall be specified for measuring water elevations in all wells to the nearest hundredth of a foot;
- a proposal for the installation of ground water monitoring wells which shall be used to define ground water quality upgradient, within, and downgradient of suspected and/or identified contaminant source areas and at the interface between ground water and surface water;
- a proposal for a ground water quality monitoring program to be conducted to define the nature and extent of ground water contamination at the Site and other affected properties. Municipal, industrial, agricultural, domestic and monitoring wells, and springs shall be considered for inclusion in the monitoring program. The monitoring program shall have a minimum frequency of [**monthly**] sampling with water level measurements;
- proposed tests (e.g., slug and/or pumping tests to determine the hydraulic properties, including horizontal hydraulic conductivity and secondary porosity, of aquifers and aquitards at the Site and

other affected properties) which shall define ground water flow relationships (directions, gradients, and velocities for both vertical and horizontal flow components) including potential aquifer interconnections, recharge areas, discharge areas, and ground water interactions with surface water. In addition, this section shall propose how the flow relationships will be evaluated with respect to contaminant distribution and the potential future movement of contaminants;

- a proposal to define ground water use(s) and the potential effect water use(s) may have on contaminant movement in both horizontal and vertical directions. Include with this proposal an inventory map showing all active, unused, and abandoned municipal, industrial, agricultural, domestic and monitoring wells, and springs within a one mile radius of the Site, and of high capacity wells and municipal water supply wells within a three mile radius of the Site; and
- a description of visual aids which will be used to present, in the RI Report, the hydrogeologic and hydrogeochemical data gathered during the Hydrogeologic Investigation (e.g., cross sections, piezometric maps, isoconcentration maps, graphical methods, and tables).

III.C.3.e. Surface Water Investigation. This section of the RI/FS Work Plan shall identify all surface water bodies within a one mile radius of the Site including rivers, lakes, ponds, wetlands, bogs, calcareous fens, low-flow streams, creeks, springs, and named and unnamed ditches. Both perennial and intermittent surface water features shall be identified. A map showing the locations of all identified surface water bodies and the location of known or suspected releases of contaminants from the Site to surface water bodies shall be included. This section shall include a proposal to evaluate each surface water body identified, evaluate its potential to be impacted by Site contaminants through releases via ground water, surface run-off, drainage, airborne deposition, and other possible pathways. This proposal shall include a plan to identify the benthic sediments and benthic community conditions underlying surface water upgradient, adjacent to, and downgradient of the contaminant source area. In addition, methodologies shall be proposed to determine the mass loading of contaminants to the surface water bodies.

The water use classification for the identified surface water body or bodies, in accordance with Minnesota Rules Chapter 7050 and the wetlands classification in accordance with Minn. Stat. §§ 103G.005, subds. 15 and 18 and 103G.201 (1988), shall be included. Identification of the water use characteristics (e.g., agricultural, recreational, and private or municipal water supply) of the identified surface water bodies shall also be included.

III.C.3.f. Air Investigation. This section of the RI/FS Work Plan shall propose methodologies for investigations to determine the nature and extent of contaminants that are or may become airborne (e.g., vapors, gases, mists, or particulates) through either natural phenomenon or as a result of activities at the Site.

III.C.4. List of Possible Technology Types and Proposed Treatability Studies. The RI/FS Work Plan shall include a comprehensive list of technology types that may be applicable to the release(s) or threatened release(s) at or from the Site. This list shall be developed considering the Remedy Selection Criteria (Part IV.C.). This list shall include: 1) technology types that prevent or eliminate the release(s) or threatened release(s) by completely destroying, detoxifying, or immobilizing hazardous substances or pollutants or contaminants and leave materials on-Site that require no long-term management; 2) technology types that prevent or minimize the release(s) or threatened release(s) by treatment process options that reduce the toxicity, mobility, or volume of the hazardous substances or pollutants or contaminants; 3) technology types that control the threats posed by the release(s) or threatened release(s) of hazardous substances or pollutants or contaminants by containment; and 4) a general description of the treatability studies necessary to evaluate the respective technology types identified under 1, 2 or 3 above. [**To save time and get the RP off on the right foot, amend this section at the time of issuance of the RFRA to identify a minimum set of possible technology types and treatability studies which should be done, e.g., "At a minimum, bioremediation treatability studies for soil and ground water shall be considered for the Site." Reminder: For any ground water contaminant pump and treat response action alternative, the RP must address process options using reinjection, infiltration, or other means of artificial recharge or other possible consumptive uses of treated ground water.**]

III.C.5. Record Retention. The RI/FS Work Plan shall provide a description of how the data obtained pursuant to this Exhibit will be managed and preserved by the RP in accordance with Part II.D of the RFRA.

III.C.6. Risk Assessment[1]. [**Coordinate with MPCA Risk Assessment personnel for NPL Sites Risk assessment concerns raised in an ATSDR health assessment. The ATSDR identified risks/health concerns must be addressed in the Baseline Risk Assessment.**] The RI/FS Work Plan shall provide a detailed description of activities that will be undertaken to conduct separate ecological and human health Baseline Risk Assessments. Ecological and human health Baseline Risk Assessments are evaluations of the actual and potential threat to public health and welfare, and the environment posed by the release(s) or threatened release(s) of hazardous substances or pollutants or contaminants, in the absence of any remedial action.

The risk assessment activities shall be conducted so as to generate the information necessary to meet the reporting requirements of the Baseline Risk Assessment as specified in Part III.E.2.

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1. An RP lacking significant risk assessment experience should be prepared to subcontract such work to qualified organization. The Baseline Risk Assessment shall be thoroughly reviewed by a technical editor to ensure that the text will be understandable by the MPCA technical staff, the MPCA Board, and the interested public.

Formats, technology, and mathematical symbols used in the Baseline Risk Assessments shall correspond as closely as possible to those presented in EPA's Superfund risk assessment guidance referred to under Part I.C. Any alternative formats, technology, mathematical models shall be proposed in the RI/FS Work Plan.

III.C.7. Interim Response Actions. The RI/FS Work Plan shall propose any Interim Response Action (IRA) that can be implemented prior to completion of the RI/FS to stabilize, contain, and/or mitigate any release(s) or threatened release(s) of hazardous substances or pollutants or contaminants, which is reasonable and necessary to protect public health or welfare, or the environment. This section shall specify the particular operable unit to which the IRA could be applied. The design for any proposed IRA shall be consistent with the Remedial Design (Exhibit B, Part III.A.).

[If MPCA staff can determine the need for particular IRAs for a given operable unit at the Site, these IRAs should be specified here - e.g., At a minimum, the RP shall propose the methodology to conduct a particular IRA for a given operable unit.]

III.C.8. Site Security and Safety Plan. A Site-specific security and safety plan shall be prepared as a separate part of the RI/FS Work Plan, describing all measures including contingency plans and Site access restrictions which will be implemented during field activities to (1) ensure protection of public health and welfare, and the environment and (2) protect the health and safety of personnel involved in the RI/FS.

III.C.9. Community Relations. **[See PIO office for guidance manual]**. The RI/FS Work Plan shall include a community relations section providing procedures for (1) informing local residents, municipalities, environmental groups, and interested parties about activities at the Site; (2) responding to inquiries from concerned citizens; and (3) cooperation with the MPCA Community Relations efforts.

III.C.10. Schedule. The RI/FS Work Plan shall propose a schedule which provides specific time frames and dates for completion of each activity and report conducted or submitted under the RI/FS Work Plan. The proposed schedule shall reflect the timelines specified in the RFRA, for conducting the RI and FS activities.

III.D. RI/FS Work Plan Implementation

Within thirty (30) days of the MPCA Commissioner approval of the RI/FS Work Plan, the RP shall initiate the RI and development and screening of response action alternatives. The RP shall complete the RI with one hundred fifty (150) days of initiating the RI activities. The RI/FS shall be conducted in accordance with all applicable federal, state, and local laws, rules, regulations, and ordinances including but not limited to Minn. Stat. ch. 103I and Minn. Rules ch. 4725 for the installation of any ground water monitoring wells.

Any necessary additional RI activities not included in RI/FS Work Plan shall be identified and proposed in the **[monthly]** reports submitted pursuant to Part II.C of the RFRA. The impact of the

additional RI activities on the List of Possible Technology Types and Proposed Treatability Studies (Part III.C.4) shall also be described in the [**monthly**] reports. If any additional RI activities will adversely affect work scheduled through the end of the upcoming [**month**] or will require significant revisions to the approved RI/FS Work Plan, the RP shall notify the MPCA Project Manager immediately of the situation followed by a written explanation within ten (10) days of the initial notification.

III.E. **Remedial Investigation Report**

Within sixty (60) days after completion of the RI, an RI Report detailing: (1) the data and results of the RI; (2) baseline risk assessment; and (3) screening of possible response action alternatives shall be prepared and submitted to the MPCA Commissioner. The RI Report shall organize and present all data generated as a result of implementation of the approved RI/FS Work Plan including, at a minimum, analytical results, assessment of completion of QA objectives, boring logs, field data sheets, and test results including data reduction and interpretation of all results. Further, the RI Report shall include:

III.E.1. Nature and Extent of the Release or Threatened Release. The RI Report shall include a description of the following:

- the nature and extent of hazardous substances or pollutants or contaminants released or threatened to be released to the soils, surface water, ground water, and air;
- the contaminant fate and migration pathways within each media;
- an evaluation of the reliability, and accuracy of the results of any computer models employed for data interpretation.

III.E.2. Baseline Risk Assessment. The results of two Baseline Risk Assessments, one addressing human health risks and one addressing ecological risks (Part III.C.6.), shall be reported as separate chapters in the RI Report.

Each chapter of the Baseline Risk Assessment shall include an executive summary written in layman's terms. A narrated video-tape walk-through of the Site and surrounding areas shall be included to highlight information presented in the Baseline Risk Assessment text.

The risk assessment reports shall provide:

III.E.2.a. Data Evaluation. An evaluation of the results of the RI showing the actual and projected concentrations of hazardous substances, pollutants or contaminants present in relevant media (e.g., soil, surface water, ground water, air, benthic sediment, and biota).

III.E.2.b. Toxicity Assessment. An identification of the hazard and toxicological properties of each contaminant identified through sampling and investigations. A comparison between the list of contaminants known to have been deposited on the Site versus those found through analyses. Identification of the chemical specific Applicable or Relevant and Appropriate Requirements (ARARs) for

hazardous substances, or pollutants or contaminants identified at the Site. Minnesota State ARARs are included in Attachment 1 to this Exhibit.

III.E.2.c. Exposure Assessment. A comprehensive exposure pathways table. An inclusion/exclusion analysis and supporting rationale shall be included for each pathway. Following the inclusion/exclusion analysis, a determination of the extent and likelihood of exposure to contaminants at or from the Site. Identification of the potential receptor populations. Provide in-depth environmental fate and transport analysis for completed exposure pathways including physical and biological degradation processes and hydrogeologic conditions.

III.E.2.d. Risk Characterization. Both a maximum exposure case analysis and a Reasonable Maximum Exposure (RME) shall be provided for each pathway.

III.E.2.e. Uncertainty and Sensitivity Analysis. If there is or will be more than one analyte of concern associated with the Site, a chemical mixtures risk assessment addressing additivity and synergism shall be conducted and reported upon.

As part of the uncertainty analysis a Synergistics Effects Uncertainty Analysis (SEUA) shall be conducted and reported upon which assumes risks posed by conditions at the Site may be underestimated by an additivity based risk characterization. The SEUA shall provide modified remediation levels necessary to compensate for possible synergistic effects.

III.E.3. Development and Screening of Response Action Alternatives. The RI Report shall include a Development and Screening of Response Action Alternatives chapter that provides an evaluation of (a) each of the response action alternatives assembled from the List of Possible Technology Types and Proposed Treatability Studies (Part III.C.4), except for those technology types that have been eliminated from further consideration by the MPCA Commissioner in approving the RI/FS Work Plan, and (b) any other technology types identified by the RP or the MPCA Commissioner prior to approval of the RI Report.

The purpose of this chapter is to document the development of response action alternatives by combining or assembling technology types and their respective process options which will be applied to specific operable units or the Site as a whole. After the response action alternatives have been developed, they will be screened to assure that only those alternatives that will likely achieve the response action objectives and cleanup levels (Part IV.A.) will be retained for further analysis in the DAR.

III.E.3.a. Describe Process Options and Document the Screening of Response Action Alternatives. All development and screening decisions shall be thoroughly documented. This documentation shall include both written description and summary tables. An example of a screening table, Table 1, is attached.

The development and screening of response action alternatives is accomplished by conducting the following tasks:

Development

From the list of technology types, as approved in the RI/FS Work Plan, develop the response action alternatives by describing the process options for each technology type and assemble the technology types with respective process options into response action alternatives. This step is accomplished by following the procedures outlined below:

- array the technology types and describe all possible process options for each technology type;
- for each process option, list the action and location specific ARARs;
- establish the volumes of contaminants and the volumes and types of contaminated media or areas of the Site to which the response action alternative will be applied (e.g. operable units); and
- assemble one or more technology type(s) and the respective process option into one response action alternative.

Screening

Once the response action alternatives have been developed, the response action alternatives are evaluated and screened using the Site Specific Response Action Objectives and Cleanup Levels (Part IV.A). Those response action alternatives that do not meet the Response Action Objectives and the Cleanup Levels are eliminated from further consideration. Response Action Alternatives that pass this screening are designated as "evaluated alternatives" and shall be further evaluated in the DAR.

The RP shall provide its recommendation and rationale regarding which response action alternatives should not be given further consideration for implementation at the Site.

III.E.3.b. Treatability Studies. This chapter of the RI Report shall provide:

- a description of all completed treatability studies and the results of any pilot studies, bench tests, or other activities that were performed to evaluate technology types and process options; and
- proposals, with time frames, for any additional treatability studies that are needed to further evaluate any response action alternatives that pass the screening and are to be further analyzed in the DAR.

III.F. **Feasibility Study Report**

Within ninety (90) days of the MPCA Commissioner's approval of the RI Report (Part IV.B.2), the RP shall prepare and submit to the MPCA Commissioner an FS Report consisting of the results of any treatability studies and a DAR. The DAR shall address all the evaluated alternatives specified by the MPCA Commissioner in approving or modifying the RI Report.

III.F.1. Treatability Studies. This section of the FS Report shall include the results of all completed and ongoing bench or pilot studies identified in the RI Report (Part III.E.3.b). In addition, for each of the technologies that have undergone treatability studies, the following factors shall be addressed and presented:

- effectiveness in treating the hazardous substances, pollutants or contaminants;
- reliability and past successes of the technology under similar conditions to those at the Site; and
- availability of the technology type and specific process option for implementation at the Site.

III.F.2. Detailed Analysis Report. This section of the FS Report shall analyze evaluated alternatives in detail considering the Remedy Selection Criteria (Part IV.C.). The DAR shall include the following elements for each evaluated alternative:

III.F.2.a. Detailed Description. Each evaluated alternative shall be described and individually assessed against the Balancing Criteria (Part IV.C.2.), namely, long term effectiveness, implementability, short term risks, total cost, and community acceptance. At a minimum, the detailed description for each evaluated alternative shall address the questions posed in Table 2 and include:

- the operable unit to which the evaluated alternative would be applied;
- a description of the technology type and process option;
- a description of the engineering considerations required for implementation (e.g., for a pilot treatment facility, any additional studies that may be needed to proceed with final response action design);
- a description of operation, maintenance, and monitoring requirements;
- a description of off-Site disposal needs and transportation plans;
- a description of temporary storage requirements;
- a description of safety requirements associated with implementation, including both on-Site and off-Site health and safety considerations;
- a description of how any of the other evaluated alternatives could be combined with this evaluated alternative and how any of the combinations could best be implemented to produce significant cost savings and/or better achieve the Site Specific Response Action objectives and Cleanup Levels (Part IV.A);
- a description/review of on-Site or off-Site treatment or disposal facilities which could be utilized to ensure compliance with ARARs; and
- a description of the evaluated alternative response action dismantling to be conducted upon completion of response action.

III.F.2.b. Comparative Analysis of Evaluated Alternatives. Once the evaluated alternatives have been described and individually assessed against the Balancing Criteria (Part IV.C.2.) a comparative analysis shall be conducted to evaluate the relative performance of each evaluated alternative. The purpose of this comparative analysis is to identify the advantages and disadvantages of each evaluated alternative

relative to one another with respect to each of the Balancing Criteria (Part IV.C.2), in order to facilitate selection of an appropriate remedy.

The comparative analysis shall include both a table and a narrative discussion describing the strengths and weaknesses of the evaluated alternatives relative to one another by using each specific component of each Balancing Criterion to evaluate the relative performance of each evaluated alternative. The narrative shall discuss how likely changes in variables could alter each evaluated alternative's relative performance. This section shall be organized in the following manner; under each individual Balancing Criterion, discuss the evaluated alternative that performs the best overall under that Balancing Criterion. Other evaluated alternatives shall be discussed in the order in which they perform. For innovative technologies, their potential advantages in performance or cost and the degree of uncertainty in their expected performance, as compared with more demonstrated technologies, shall also be discussed. Table 2 provides the outline of a comparative analysis table to be completed as part of the requirements of this section.

The presentation of differences among the evaluated alternatives can be measured either qualitatively or quantitatively, as appropriate, and shall identify substantive differences (e.g., greater short-term risk concerns or greater cost). Quantitive information that was used to assess the evaluated alternatives (e.g., specific cost estimates, time until the Site-specific response action objectives and cleanup levels are met, and levels of residual contamination) shall be included in these discussions.

III.F.2.c. Recommended Evaluated Alternative(s) and Conceptual Design. The RP shall include in the DAR its recommendation of the evaluated alternative (or combination of evaluated alternatives) which should be implemented at the Site. The purpose of preparing a conceptual design is to illustrate all aspects of the RP recommended evaluated alternative (or combination) in sufficient detail to enable the MPCA Commissioner to fully evaluate the RP recommended evaluated alternative (or combination). The conceptual design for the RP recommended evaluated alternative (or combination) shall include, but not be limited to, the elements listed below:

- a conceptual plan view drawing of the overall site, showing general locations for response action components;
- conceptual layouts (plan and cross sectional views where required) for the individual components to be installed, or actions to be implemented;
- conceptual design criteria and rationale;
- a description of types of equipment required, including approximate capacity, size, and materials of construction;
- process flow sheets, including chemical consumption estimates and a description of the process;
- an operational description of process units or other components;
- a description of unique structural concepts for components;
- a description of operation and maintenance requirements;
- a discussion of potential construction problems;
- right-of-way requirements;

- additional engineering data required to proceed with design;
- a discussion of permits that are required pursuant to environmental and other statutes, rules, and regulations;
- implementation cost estimate;
- annual O&M cost estimates;
- remedial action dismantling cost; and
- estimated implementation schedule.

IV. MPCA COMMISSIONER ACTIONS

IV.A. **Establishment of Site Specific Response Action Objectives and Cleanup Levels.** The MPCA Commissioner shall assess data as it is obtained through implementation of the RI. When sufficient data exists, the MPCA Commissioner shall specify and notify the RP of the Site-specific response action objectives and cleanup levels for the contaminants, environmental media of concern, and exposure pathways associated with the Site. The Site-specific objectives and cleanup levels shall be determined using ARARs, the "Compilation of Ground Water Rules and Regulations MPCA Superfund Program," dated March 27, 1991, Attachment I, [**soil cleanup guidance (date)**], and documented case studies. The MPCA Commissioner will notify the RP of the Site-specific response action objectives and cleanup levels no later than the approval of the RI Report.

IV.B. **Review of Submittals.** The RP shall submit to the MPCA Commissioner all work plans, reports, or other documents (submittals) required by this Exhibit. The review and approval, modification, or rejection of submittals shall be in accordance with this Section and Part IV of the RFRA. Given the MPCA preference for implementing response actions in an expedient manner, the MPCA Commissioner may request implementation of an IRA at any point during the RI/FS.

IV.B.1. Approval of RI/FS Work Plan. The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the RI/FS Work Plan. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the RI/FS Work Plan with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RI/FS Work Plan that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which the RP shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional information.

If the MPCA Commissioner rejects the RI/FS Work Plan, the Commissioner will: 1) specify the deficiencies in the RI/FS Work Plan that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which the RP shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised RI/FS Work Plan.

As part of reviewing the RI/FS Work Plan, the MPCA Commissioner will eliminate from further consideration any possible technology types that are clearly not feasible or effective considering the Remedy Selection Criteria (Part IV.C.), and may identify other possible technology types and process options to be analyzed in the Development and Screening of Response Action Alternatives chapter (Part III.E.3) of the RI Report.

Site security and safety are the responsibility of the RP. The MPCA Commissioner may comment on the Site Security and Safety Plan but will neither approve nor disapprove that plan. Within ten (10) days of notification of the MPCA Commissioner's approval of the RI/FS Work Plan, the RP shall implement the Site Security and Safety Plan, taking into account the comments of the MPCA Commissioner.

IV.B.2. Approval of the RI Report. The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the RI Report. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the RI Report with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RI Report that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which the RP shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional formation.

If the MPCA Commissioner rejects the RI Report, the Commissioner will: 1) specify the deficiencies in the RI Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which the RP shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised RI Report.

IV.B.2.a. Evaluation of the Response Action Alternatives

The MPCA Commissioner shall, as part of reviewing the RI Report, evaluate the response action alternatives presented in the Development and Screening of Response Action Alternatives chapter (Part III.E.3). In determining whether to eliminate a particular response action alternative from further consideration, the MPCA Commissioner will determine whether that alternative meets the response action objectives and cleanup levels (Part IV.A) specified for the Site. In approving the RI Report the MPCA Commissioner will specify the evaluated alternatives to be addressed in the DAR.

IV.B.3. Approval of Feasibility Study Report. The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the FS Report. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the FS Report with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the FS Report that necessitate the need for information necessary to correct the deficiencies; 2) provide direction to address the deficiencies; 3) specify the manner in which the RP shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the revised FS Report.

If the MPCA Commissioner rejects the FS Report, the Commissioner will: 1) specify the deficiencies in the FS Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which the RP shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the revised FS Report.

IV.C. Remedy Selection Criteria. **[If preparing the exhibits for an NPL site use the remedy selection criteria specified in the NCP.]** The purpose of implementing any response action is to protect the public health, welfare, and the environment by preventing, minimizing or eliminating the release(s), or threatened release(s) of hazardous substances, pollutants, or contaminants. Protection of public health, welfare, and the environment is best achieved by implementing a permanent remedy for the Site. An implemented remedy is considered permanent when it allows for unrestricted use of all land and natural resources impacted by the contaminants and, except for the purpose of treatment, does not involve removal of the contaminants to another site and minimizes exchange of the contaminants to other environmental media.

The MPCA Commissioner will apply the following threshold, balancing criteria and community acceptance to select a final response action from amongst evaluated alternatives.

IV.C.1. Threshold Criterion. Each response alternative or evaluated alternatives must meet the threshold criterion of providing overall protection for the public health and welfare, and the environment. This criterion is met if the response action alternative or the evaluated alternative will achieve the response action objectives and cleanup levels identified pursuant to the Establishment of Site Specific Response Action Objectives and Cleanup Levels (Part IV.A.) or provides for a permanent remedy.

IV.C.2. Balancing Criteria. Evaluated alternatives that meet the threshold criterion of overall protection of public health and welfare, and the environment shall be evaluated using the Balancing Criteria listed below. The evaluated alternative that provides the best balance among the Balancing Criteria in consideration of the site-specific circumstances shall be selected as the final response action. The Balancing Criteria are listed in order of priority with long-term effectiveness being the most important.

- Long-Term Effectiveness
  Long-term effectiveness is the ability of an evaluated alternative to maintain the desired level of protection of public health and welfare, and the environment over time. Permanent remedies provide absolute long-term effectiveness. In the event a permanent remedy is not feasible, evaluated alternatives that significantly alter the hazardous substances or pollutants or contaminants to produce significant reductions in toxicity, mobility, or volume through treatment will be preferred. In addition, the ability of the alternative to obtain and/or manage treatment residuals, minimize transfer of contaminants to another environmental media, and maintain established response action objectives and cleanup levels over time shall be a major consideration.
- Implementability
  The technical and administrative feasibility of implementing the evaluated alternative and the availability of goods and services needed to implement the evaluated alternative shall be considered.
- Short-Term Risks
  The short-term risks that may be posed as a result of implementing an evaluated alternative shall be considered and weighted against the ultimate long-term benefits of implementing that evaluated alternative.
- Total Costs
  The complete cost breakdown of implementation of the evaluated alternative including the projected costs of any long-term monitoring, operation and maintenance, and response action dismantling shall be considered. The future costs to replace the alternative or respond to a future release shall also be considered in this evaluation.

IV.C.3. Community Acceptance. The degree of community acceptance shall be determined for each evaluated alternative.

The community shall be consulted regularly in regard to the response action alternatives available for remediation at the Site. Efforts will be made to inform the community about the hazards of the Site and the advantages and disadvantages of various approaches to remediation and to gain an understanding of the concerns and preferences of the community with regard to the final remedy for the Site. The community's concerns and response action preferences will be considered when the MPCA Commissioner selects a remedy.

IV.D. Selection of Response Action and Record of Decision

The MPCA Commissioner will select the final response action(s) and will document this selection in a Record of Decision (ROD). The final RI and FS Reports, as approved by the MPCA Commissioner, will, with the MPCA Site file, form the basis for the selection of the final response action for the Site and will provide the information necessary to support the development of the ROD. The ROD will identify the selected evaluated alternative (or combination of evaluated alternatives) to be implemented by the RP pursuant to Exhibit B to the RFRA. The ROD shall be appended to and made an integral part of the RFRA.

June 18, 1990

STATE ARARs

The Applicable or Relevant and Appropriate Requirements apply to all sites on the Minnesota Permanent List of Priorities and govern removals and response actions under the Minnesota Environmental Response and Liability Act.

MINNESOTA POLLUTION CONTROL AGENCY

Minn. Stat. 115.03	PERMITS REQUIRED	- MPCA may require and enforce a permit for any discharge to the waters of the State (SDS or NPDES permit).
Minn. Stat. 115.061	RELEASE REPORTING	- Duty to notify and prevent pollution of the waters of the state
Minn. Stat. Ch. 115B	STATE SUPERFUND	- Cleanup as reasonable and necessary Permanent List of Priorities Classification of Sites (may be more than one) A-Declared Emergency B-Post-response O & M C-Response Action Under Way D-RI/FS - Hazardous Substance Injury Compensation Fund (Victim's Compensation Board)
Minn. Stat. 115.063	GROUND WATER PROTECTION	- Policy to protect GW as potable water source
Minn. Stat. 103H	1989 GW PROTECTION ACT	- Nondegradation Goal - Promotion and development of BMPs - Water Resources Protection Requirements - Identification and protection of Sensitive Areas

ATTACHMENT A

Minn. Rule 7045	HAZARDOUS WASTE	- Hazardous Waste Listing - Generator Standards - Transporter Standards - Facility Standards - Interim-status Standards - Recycling Standards - Ground Water Protection to Background, MCL's, ACL's
Minn. Rule 7050	STANDARDS FOR WATERS	- Classifies waters of the state (surface/ground) - WQ standards for the classified waters Class 1-Drinking Water Suitability A-Without any treatment. Primarily underground waters with a high degree of natural protection. B-Only Chlorination required. Surface and ground waters with a moderately high degree of natural protection. C-Physical/Chemical Treatment with Chlorination. Primarily for surface waters and aquifers without adequate protection such as fractured and channeled limestone, unprotected impervious rock where water is obtained from mechanical fractures and joints, and surficial coarse gravels. D-Significant treatment required. Surface and ground waters such as those identified above. Class 2-Fisheries and Recreation Class 3-Industrial Consumption Class 4-Agriculture and Wildlife Class 5-Aesthetic and Navigation Class 6-Other Uses Class 7-Limited Resource Value

		- Prohibition of at or below grade wells - Licensure and registration requirements - Establishment of Well Advisory Areas - Permit requirements for wells (inc. mon. wells)
Minn. Rule 4730	RADIATION CONTROL	- Regulates Sources and uses of radiation - Monitors transportation and disposal of radio-active material

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

Minn. Stat. 105.405	WATER SUPPLY MANAGEMENT	- Requirement for appropriation permit - Legislative approval for appropriation >2MGD, except for remediation systems
Minn. Rule 6115	PROTECTED WATERS/WATER APPROPRIATION	- Classifies and protects lakes and wetlands - Permits required for water appropriations greater than 10,000 gpd or 1,000,000 gpy - Priority Listing for water use
Minn. Rule 6120	SHORELAND MANAGEMENT	- Placement of structures and facilities, shoreland alterations, use standards

MINNESOTA DEPARTMENT OF AGRICULTURE

Minn. Stat. 18B	PESTICIDE CONTROL	- Development of best management practices for distribution, storage, handling, use, and disposal of pesticides - Chemigation permits - Waste pesticide collection program - Pesticide release incidents - License and training requirements for dealers and applicators - Enforcement procedures
Minn. Stat. 18C	FERTILIZERS, SOIL AMENDMENTS, AND PLANT AMENDMENTS	- Regulation of storage, handling, distribution, use, and disposal of fertilizer - Chemigation permits - Registration of specialty fertilizer - Distributors' reports
Minn. Stat. 18D	AGRICULTURAL, CHEMICAL LIABILITY, INCIDENTS, AND ENFORCEMENT	- Chemical application liability - Reporting Incidents - Corrective Actions - Inspection, sampling, analysis - Enforcement procedures/penalties
Minn. Stat. 18E	AGRICULTURAL CHEMICAL INCIDENT PAYMENT AND REIMBURSEMENT	- Surcharges on registration, inspection, dealer/applicator, and license application fees to fund Agricultural Chemical Response and Reimbursement Account - Reimbursement of Response costs

TO BE CONSIDERED

MINNESOTA DEPARTMENT OF ADMINISTRATION

Minn. Rule 1300	MINNESOTA STATE BUILDING CODE
Minn. Rule 1305	AMENDMENTS TO UNIFORM BUILDING CODE
Minn. Rule 1315	ELECTRICAL CODE

Minnesota Department of Natural Resources

Water Appropriations	January 11, 1989, memorandum from Joseph N. Alexander, Commissioner of the Department of Natural Resources to Gerald L. Willet, MPCA Commissioner, regarding Department of Natural Resources policy relative to water appropriations from the Mount Simon-Hinckley Aquifer.

Minnesota Pollution Control Agency

Air Quality-CFC Release Permitting	Policy established at the request of the MPCA Board.
Prepurchase Investigations	Guidance Document for conducting Phase I Prepurchase Investigations for property transfers (pursuant to Minn. Stat. 115B).

Minnesota Department of Health

Recommended Allowable Drinking Water Limits	MDH Release #2 (November 16, 1988)
10-5 Risk Level	Unpublished September 1985 MDH report on tolerable risk levels/exposures.

COMPILATION OF GROUND WATER RULES AND REGULATIONS
MINNESOTA POLLUTION CONTROL AGENCY
SUPERFUND PROGRAM

March 27, 1991

A. APPROACH OF MINNESOTA SUPERFUND PROGRAM TO GROUND WATER CLEANUP

The following describes the approach of the MPCA in selecting response actions (both remedial and removal) to address the quality of ground water affected by a release or threatened release under the Minnesota Superfund program, including sites on the Minnesota Permanent List of Priorities (PLP) under the Minnesota Superfund Program and Property Transfer sites.

In selecting remedial actions to address ground water at the MPCA:

1. selects remedies consistent with:

-MERLA, (Minn. Stat. ch. 115B (1990));
-Minnesota ARARs identified for the particular site (June 18, 1990); and
-the National Contingency Plan, 40 C.F.R Part 300, for NPL sites and, as reasonable and necessary, for PLP sites.

2. establishes ground water cleanup and degradation prevention goals contingent on a site-specific evaluation of risks and based on the following:

a. prevention of any or further ground water degradation (Minn. Stat. § 103H.001 (1990)) both in terms of extent and magnitude, for sites, including at sensitive areas, where ground water is not yet affected or is impacted at levels below Minnesota Department of Health (MDH) Recommended Allowable Limits (RALs) and 1 in 100,000 cumulative risk for carcinogens (see, MDH paper entitled "Tolerable Risks," September 1985), or EPA Maximum Contaminant Levels (MCLs), whichever is more stringent (The degradation prevention authority is, however, supplemental to other cleanup authority and does not restrict the use of the other cleanup authorities. Minn. Stat § 103H.280 (1990));

b. remediation to RALs and 1 in 100,000 cumulative risk for carcinogens (see, "Tolerable Risks"), or to MCLs, whichever is more restrictive, for sites not described in 2(a) (sites involving ground water already exceeding RALs or MCLs), see generally, Minn. Rules pt. 7060.0400 (1989); and prevention of further ground water degradation, both in terms of extent and magnitude as outlined in 2.a.; or

c. adjustment to remediation levels such that the ground water contaminants do not pose an unacceptable risk based on a site specific assessment of risks to the public health, or welfare, or the environment at sites as described in Attachment B.

3. evaluates and determines whether interim response action is reasonable and necessary, as described in Attachment C.

4. selects ground water remedial action alternatives that minimize the transfer of toxic pollutants from one environmental medium to another.

5. encourages conservation of ground water (Minn. Rules pt. 6115.0220, and as promoted by the Groundwater Protection Act of 1989, and see generally, Department of Natural Resources-Division of Waters paper entitled "Consumptive Water Use," February 15, 1990), and specifically considers the reuse and recirculation of treated waters to promote more efficient and effective cleanups (Minn. Stat. § 115B.02, subd. 16 (1990)), provided adequate monitoring and maintenance safeguards are present, Minn. Stat. § 115B.02, subd. 16 (1990). Any proposal involving the return of treated ground water will have to address the provisions of Minn. Rules pt. 7060.0600 dealing with discharges to the unsaturated zone or the saturated zone and possibly Minn. Rules pt. 4725.2300 prohibiting disposal into wells.

6. encourages the use of innovative (advanced treatment) technologies, 40 C.F.R. § 300.430(a)(iii)(E) such as bioremediation (Minn. Stat. § 116.54 (1990)), in order to achieve more efficient and effective cleanups and promote permanent destruction, immobilization, or detoxification of contaminants, CERCLA § 9621(b), Minn. Stat. § 115B.02, subd. 16 (1990).

7. In addition to number 2 above, for sites involving multiple contaminants or pathways:

i) evaluates human health risk using the EPA document entitled "The Risk Assessment Guidelines of 1986" (EPA/600/8-87/045);

ii) implements institutional controls, 40 C.F.R. § 300.430(a)(iii)(D); and

iii) if cumulative risk is in excess of 10^{-4}, considers the criteria found at 40 C.F.R. § 300.430(e)(2)(i)(A) when determining the cleanup level to be attained, 40 C.F.R. § 300.430(e)(2)(D)) - See Attachment D.

8. establishes a compliance boundary for determining the adequacy of a response action, which is a site-specific determination and should be as close to the source of the release of contaminants as feasible in order to mitigate actual or potential impacts on present and future beneficial uses of the ground water (Minn. Rules pt. 7060.0400 (1989)) and prevents further degradation of ground water (Minn. Stat. § 103H.001 (1990). The order of preference for determining the compliance boundary should be from smaller to larger geographic areas:

1) Source boundary;
2) Facility boundary;
3) Property boundary;
4) Site boundary.

Depending on site-specific conditions, some of these boundaries may be one and the same. In some circumstances, the site boundary may fall entirely within the property boundary and circumscribe a smaller area.

A lower compliance boundary may be appropriate at specific sites where there is a potential for contaminant movement downward to a deeper aquifer. The contact between hydrogeologic units is an appropriate compliance boundary.

9. addresses ground water-surface water interactions in the context of Minn. Rules pts. 7050.0217, 7050.0218, and 7050.0220 (1990) (see Attachment E for nonpoint sources of pollutants).

Cleanup efforts are to return usable ground water to its beneficial use wherever practical. 40 C.F.R. § 300.430(a)(iii)(E). In Minnesota, this use is as a potable water supply. Minn. Rules pt. 7060.0400 (1989). The protection is for the present and future generations of the water users. Minn. Stat. § 115.063 (1990). Treatment of a drinking water supply is not a substitute for ground water restoration. 40 C.F.R. § 340.435(f)(4). Institutional controls may be used during the conduct of the remedial investigation and implementation of the remedial action and, where necessary because of site-specific circumstances, as a component of the completed remedy. Institutional controls include well advisories, zoning restrictions, deed restrictions, or land use controls. Institutional controls cannot be substituted for active response actions. 40 C.F.R. § 300.430(a)(iii)(D).

This ground water cleanup approach will be re-evaluated and updated as reasonable and necessary to incorporate future developments in the statutory or regulatory framework.

B. BACKGROUND

1. Introduction

The "How Clean Is Clean" question has been faced by each cleanup program since its inception. Each cleanup program must be administered in accordance with the legal framework provided by the state and federal governments. The framework includes statutory and regulatory provisions for each program. The statutes and regulations may be directly applicable (i.e., permits required) or may be appropriate to direct or guide the implementation of a given remedial or removal action.

For Minnesota Superfund sites, where the state is the lead agency for selecting cleanup actions, the threshold issue is whether the site is on the National Priority List (NPL). The NPL is compiled by the U.S. Environmental Protection Agency (EPA) pursuant to CERCLA § 105. To be listed as a NPL site, the site must have received a score of at least 28.5 using the (National Contingency Plan (NCP)) Hazard Ranking System II. Usually the sites are nominated by the state. For NPL sites, the cleanup objectives are based on CERCLA and NCP requirements, as well as state requirements under MERLA. CERCLA and NCP requirements are applied because the state is exercising lead agency authority under an agreement with the EPA and is striving, through completion of the required remedial actions, to delete the site from the NPL. If a site is not on the NPL, cleanup objectives will be based upon MERLA with consideration of standards and objectives used under CERCLA.

The original Federal Superfund law is the Comprehensive Environmental Response and Liability Act of 1980 (CERCLA), Public Law 96-510, 42 U.S.C. §§ 9601 et seq. The Federal Superfund law has been amended by the Superfund Amendments and Reauthorization Act (SARA), Public Law 99-499, October 17, 1986. Specific procedures and standards for selecting a cleanup remedy under CERCLA have also been set forth in the National Contingency Plan adopted by the EPA in March, 1990. 40 C.F.R. Part 300. CERCLA dictates that state and federal regulations which are Applicable or Relevant and Appropriate Requirements (ARARs) must be applied to removal or remedial actions taken under the Federal Superfund program unless specifically waived. CERCLA § 121(d)(2)(A) and 40 C.F.R. § 300.400(g)(2). The Minnesota Pollution Control Agency (MPCA) has identified those state laws and regulations that are potential ARARs for Superfund cleanups in Minnesota. The latest listing of Minnesota ARARs is dated June 18, 1990. These ARARs are set out in Attachment A.

If the site is not on the NPL, the site cleanup is administered under the Minnesota Superfund Law. Minnesota Environmental Response and Liability Act (MERLA), Minn. Stat. §§ 115B.01 to 115B.20 (1990). Under MERLA, the ultimate criterion/objective is the protection of "the public health or welfare or the environment." Minn. Stat. §§ 115B.02, subds. 16 and 17 and 115B.17, subd. 1 (1990). There have been no similar developments to SARA or the NCP under Minnesota Statutes or rules to enunciate detailed procedures or standards for selecting Superfund cleanup actions. However, cleanup actions taken or requested by the MPCA are to be "reasonable and necessary" to provide the needed protection. Minn. Stat. § 115B.17, subds. 1(a) and 6 (1990). The MPCA has drawn on a number of sources, in addition to MERLA, for objectives, standards, and procedures for selecting "reasonable and necessary" cleanup actions. Those sources include other applicable state environmental laws and rules, MDH rules and guidance regarding drinking water standards, and the requirements and practice of the EPA in selecting cleanup actions under CERCLA. The procedures and standards for determining an appropriate remedy under MERLA have evolved through eight years of experience by the MPCA in overseeing remedy selection and implementation, including acting as lead agency in selecting and overseeing site cleanups of Federal Superfund sites pursuant to cooperative agreements with the EPA under CERCLA, § 104(d).

Prior to a removal or remedial action, the NCP charges that the lead agency conduct, as appropriate, a field investigation for the Superfund site. The following factors are to be assessed to:

> characterize the nature of and threat posed . . . and gather data necessary to assess the extent to which the release poses a threat to human health or the environment.
>
> (i) Physical characteristics of the site, including important surface features, soils, geology, hydrogeology, meteorology, and ecology;
>
> (ii) Characteristics or classifications of air, surface water, and ground water;
>
> (iii) The general characteristics of the waste, including quantities, state, concentration, toxicity, propensity to bioaccumulate, persistence, and mobility;
>
> (iv) The extent to which the source can be adequately identified and characterized;
>
> (v) Actual and potential exposure pathways through environmental media;
>
> (vi) Actual and potential exposure routes, for example, inhalation and ingestion; and
>
> (vii) Other factors, such as sensitive populations, that pertain to the characterization of the site or support the analysis of potential remedial action alternatives.

40 C.F.R. § 300.430(d)(2).

The following describes the legal framework used by the MPCA in selecting cleanup actions that address the quality of ground water affected by a release or threatened release under MERLA. Before taking any cleanup actions using state Superfund money, the MPCA must first request any known persons who are responsible for the release to take cleanup actions which the MPCA deems reasonable and necessary. Minn. Stat. § 115B.17, subd. 1 (1990). In taking cleanup actions using Superfund money and in requesting responsible parties to take such actions, the MPCA will use this framework and approach in determining what actions it deems to be reasonable and necessary for a specific site. Although this document is referred to as a "compilation," it should not be construed or interpreted as being a complete or comprehensive statement of

the statutes or rules that may be considered in determining what cleanup actions are reasonable and necessary for a specific ground water cleanup site. Statutes, rules, and policies affecting ground water quality are continuing to develop. This development will be taken into account in determining whether future proposed cleanup actions are reasonable and necessary to protect the public health and welfare and the environment.

2. Minnesota Statutes

The Minnesota Superfund program is authorized by the Minnesota Environmental Response and Liability Act (MERLA). Minn. Stat. ch. 115B (1990). MERLA identifies two actions, remedial and removal actions, which can be taken in response to the release or threatened release into the environment of a hazardous substance or a pollutant or contaminant, in order to protect the public health or welfare or the environment. Minn. Stat. § 115B.02, subd. 16 and 17 (1990). For the Minnesota Superfund program, a remedy or remedial action means "those actions consistent with a permanent remedy taken . . . to prevent, minimize, or eliminate the release in order to protect the public health or welfare or the environment." Minn. Stat. § 115B.02, subd. 16 (1990). Removal action includes "other actions necessary to prevent, minimize, or mitigate damage to the public health or welfare or the environment." Minn. Stat. § 115B.02, subd. 17 (1990). Removal actions in the Superfund program are generally conducted in emergency situations or when a release or threatened release can be controlled or detoxified by short-term action.

The other major environmental cleanup programs work under similar legislative provisions. For the Petrofund program, a corrective action means "an action to minimize, eliminate, or clean up a release to protect the public health and welfare or the environment." Minn. Stat. § 115C.02, subd. 4 (1990). For the Solid Waste regulatory program, closure requirements are to be established that will "prevent, mitigate, or minimize the threat to public health and the environment posed by closed disposal facilities." Minn. Stat. § 116.07, subd. 4g (1990). For an agrichemical incident (a release or threatened release to the environment which may cause unreasonable adverse effects to the environment), a corrective action is "taken to minimize, eliminate, or clean up an incident." Minn. Stat. § 18D.01, subd. 4 (1990), administered by the Minnesota Department of Agriculture.

Other laws provide requirements or policies for protecting the state's ground water. The Minnesota Water Pollution Control Act contains the following provisions that have an impact on ground water. Minn. Stat. §§ 115.01 to 115.37 (1990). Minn. Stat. § 115.063, the state's potable water protection policy, related to the disposal of hazardous and radioactive waste, provides in part:

> (1) the waters of the state, because of their abundant quantity and high natural quality, constitute a unique natural resource of immeasurable value which must be protected and conserved for the benefit of the health, safety, welfare, and economic well-being of present and future generations of the people of the state;
>
> (2) the actual or potential use of the waters of the state for potable water supply is the highest priority use of that water and deserves maximum protection by the state . . . .

Minn. Stat. § 115.063 (1990).

Every person has a statutory duty to notify the MPCA of the discharge of any material under that person's control that may cause any water pollution. If a discharge occurs, "the responsible person shall recover as rapidly and as thoroughly as possible such substance or material and take immediately such other action as may be reasonably possible to minimize or abate pollution of waters of the state caused thereby." Minn. Stat. § 115.061 (1990).

Minn. Stat. § 115.42 also provides "[i]t is the policy of the state to provide for the prevention, control, and abatement of pollution of all waters of the state, so far as feasible and practical, in furtherance of conservation of such waters and protection of the public health and in furtherance of the development of the economic welfare of the state." Minn. Stat. § 115.42 (1990).

Minn. Stat. § 115.44 directs the MPCA to "group the designated waters of the state into classes, and adopt classifications and standards of purity and quality therefor. Such classification shall be made in accordance with considerations of best usage in the interest of the public . . . ." Minn. Stat. § 115.44, subd. 2 (1990).

The Groundwater Protection Act of 1989 established a degradation prevention goal. Minn. Stat. §§ 103H.01 to 103H.280 (1990). Degradation of ground water, as caused by human activities, is to be prevented where it is currently practicable. Minn. Stat. § 103H.001 (1990). Sensitive areas, as defined in Minn. Stat. § 103H.005, subd. 13 (1990), are also to be protected. Minn. Stat. § 103H.101, subd. 5 (1990). Promotion of best management practices (BMPs) is the first response to the detection of such ground water pollution. Minn. Stat. § 103H.275, subd. 1(b) (1990). BMPs are voluntary practices. Minn. Stat. § 103H.005, subd. 4 (1990). If the BMPs are not effective, the state may adopt water resource protection requirements (WRPRs) that are designed to prevent and minimize the pollution to the extent practicable and prevent pollution from exceeding health risk limits (HRLs). Minn. Stat. § 103H.275, subd. 1(b) and (c) (1990). The authority given to the MPCA under this Act "is supplemental to other authority given by law and does not restrict other authorities." Minn. Stat. § 103H.280 (1990).

3. Minnesota Rules

Under its broad statutory authority to protect the quality of waters of the state, the MPCA has adopted general policies and standards for the protection of ground water from pollution under Minn. Rules ch. 7060.

Minn. Stat. ch. 115 grants the MPCA the power "to adopt, issue, reissue, modify, deny, or revoke, enter into or enforce reasonable orders, permits, variances, standards, rules, schedules of compliance, and stipulation agreements, under such conditions as it may prescribe, in order to prevent, control, or abate water pollution . . . ." Minn. Stat. § 115.03, subd. 1(e) (1990). Under this authority, the MPCA promulgated Minn. Rules ch. 7060 - Underground Waters. The purpose of Chapter 7060 is "to preserve and protect the underground waters of the state by preventing any new pollution and abating existing pollution." Minn. Rules pt. 7060.0100 (1989).

Under these rules, the MPCA's policy is to:

> . . . consider the actual or potential use of the underground waters for potable water supply as constituting the highest priority use and as such to provide maximum protection to all underground waters. The ready availability nearly statewide of

> underground water constitutes a natural resource of immeasurable value which must be protected as nearly possible in its natural condition. For the conservation of underground water supplies for the present and future generations and prevention of possible health hazards, it is necessary and proper that the agency employ a nondegradation policy to prevent pollution of the underground waters of the state.

Minn. Rules pt. 7060.0200 (1989).

Minn. Rules pt. 7050.0220 includes specific standards of quality and purity for designated classes of waters of the state, both surface and ground water. Ground waters are all considered under Class 1 - Domestic Consumption. Minn. Rules pt. 7060.0400 similarly classifies ground water according to its highest priority use as a potable water supply; that is, as a present or future source of drinking, culinary, or food processing water. The rule further provides that the spread of pollutants should be minimized, further discharges of wastes into the ground water should be prohibited, and degraded ground water should be rehabilitated for its priority use. Minn. Rules pt. 7060.0400 (1989).

The MDH has adopted rules for the quality of public drinking water supplies. Under Minn. Stat. § 144.381 to 144.387, the MDH is authorized to establish and enforce standards for the quality of public water supplies that are no less stringent than standards set by the EPA under the federal Safe Drinking Water Act, 42 U.S.C. §§ 300f to 300j-11. The MDH rules include maximum contaminant levels (MCLs) for a number of inorganic and organic chemicals that may constitute hazardous substances under MERLA. Minn. Rules ch. 4720; see especially, Parts 4720.0700 and 4720.0800. MCLs serve as the minimum standard of acceptance of public drinking waters as a potable supply. Providing a clean supply of drinking water in compliance with MCLs may be required as part of a MERLA remedial action where the release of hazardous substance has contaminated a public drinking water supply.

The MDH MCLs apply only to public drinking water supplies. The MDH has recently developed a third list of recommended allowable levels of drinking water contaminants (RALs) that the MDH uses in advising on the safety of contaminated private drinking water supplies. See, Minnesota Department of Health paper entitled "Recommended Allowable Limits for Drinking Water Contaminants," Release #3 (January 1991). These RALs may also be relevant in assessing risks from contamination of public water supplies where no MCL has been set for a specific compound. The RALs serve as the minimum recommended standard of acceptability of private drinking waters as a potable supply. The MDH has also been granted authority to adopt health risk limits (HRLs) for systemic and carcinogenic toxicants in ground water under the Groundwater Protection Act of 1989. Minn. Stat. § 103H.201 (1990).

In their natural state, ground waters in Minnesota are of good quality and generally would meet the state's public water supply standards (health-related). Minn. Rules ch. 4720 (1989). There are instances where the ground waters may naturally have objectionable aesthetic characteristics (i.e., elevated iron/manganese, elevated sulfates), but the ground water quality is generally within state drinking water standards. Except for some relatively isolated pockets, Minnesota does not have the naturally poor quality aquifers that occur elsewhere in the nation. See MPCA, An Appraisal of Minnesota's Ground Water Quality (June 1987).

MERLA provides that cleanup must protect public health or welfare or the environment. Since ground water is classified for use as a potable water supply, cleanups under MERLA will generally require that ground water be protected as a drinking water source. For contaminants occurring individually, MCLs or RALs mark the concentration level at which a contaminant concentration first becomes unacceptable for drinking water supplies. A cleanup at least to the MCLs or RALs provides a standard of quality for drinking water that is generally reasonable and necessary to protect public health. Considerations of the public welfare or environment may also warrant cleanup to levels more stringent than public health considerations alone.

Minn. Rules pt. 7060.0500 establishes a nondegradation policy that waste disposal be controlled such that the natural water quality is preserved, unless a determination is made otherwise by the MPCA for very specific reasons. At a minimum, the ground water quality must be maintained to preserve present and future beneficial uses of the ground water. Minn. Rules pt. 7060.0500 (1989).

When surface water contamination may result from the inflow of contaminated ground water, either site specific criteria under Minn. Rules pts. 7050.0217 and 7050.0218 (1990) or the numerical water quality standards under Minn. Rules pt. 7050.0220 (1990) apply. A number of Superfund sites also currently have National Pollutant Discharge Elimination System water quality permits administered by the MPCA.

4. Federal Statutes

The Federal Superfund is authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), Public Law 96-510, 42 U.S.C. §§ 9601 et seq. MERLA is largely modeled after CERCLA. CERCLA was subsequently amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Public Law 99-499, October 17, 1986. SARA added Section 121 to CERCLA, which provides some specific cleanup requirements. Among the changes in § 121 is the preference for permanence in selecting a remedy (CERCLA § 121(b)) and the use of applicable or relevant and appropriate requirements (ARARs) (CERCLA § 121(d)).

5. Federal Rules

The National Contingency Plan (NCP), as published by EPA in the Federal Register dated March 8, 1990, implements the requirements of CERCLA § 121 for using ARARs, as well as other standards and criteria, to guide cleanup decisions at Superfund sites, where EPA exercises its cleanup authority or the state exercises authority under a cooperative agreement with EPA. As defined in the March 8, 1990, NCP, the "appropriate and relevant requirements" portion of ARARs means:

> those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

40 C.F.R. § 300.5.

The NCP also provides that, in addition to ARARs, the EPA or MPCA "may, as appropriate, identify other advisories, criteria, or guidance to be considered for a particular release. The 'to be considered' (TBC) category consists of advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies." 40 C.F.R. § 300.400(g)(3).

Where ARARs do not exist, the NCP provides that usable ground water is to be returned to its beneficial use wherever practicable. 40 C.F.R. § 300.430(a)(iii)(F). The 10^{-6} risk level is the point of departure for cleanup decisions, with a range of 10^{-4} to 10^{-6} being acceptable. 40 C.F.R. § 300.340(e)(2)(A)). For Class I and Class II ground waters, the Safe Drinking Water Act Maximum Contaminant Levels (MCLs) will serve as cleanup standards. The classification of ground water is based on the 1986 EPA draft report "Guidelines for Ground Water Classification." Class I generally represents sole source drinking water supply aquifers. Class II aquifers are current or potential drinking water supply aquifers. Class III aquifers contain ground waters that are not considered for drinking water supply, are of limited beneficial use, and cannot be treated for drinking water purposes using conventional treatment technologies. In Minnesota, virtually all ground water would fall within Class II. There are also some aquifers that are effectively Class I and, as noted previously, there are isolated pockets of Class III ground waters. In other words, where ground water is or could be used as a drinking water supply, contaminated ground water must be restored to be acceptable as a potable water supply. The MCLs, which apply to public drinking water supplies, are the federal measure of acceptability. The NCP also provides that "ground . . . water measures initiated for the primary purpose of providing a drinking-water supply, not for the purpose of restoring ground water" are not "deemed to constitute treatment or other measures to restore contaminated ground water. . . ." 40 C.F.R. § 300.435(f)(4).

At NPL Superfund sites, the goal of the Federal Superfund program is to return usable ground water to its beneficial uses within the timeframe that is reasonable, given the particular circumstances of the site. In addition to this cleanup goal, Minnesota also has a degradation prevention goal for ground water which may be applicable as supplemental authority during the remedial actions. Minn. Stat §§ 103H.001 and 103H.280 (1990).

Attachments: A. Minnesota ARARs June 18, 1990

ARARs FOUND IN RRP PACKET.

B. Adjustments to Ground Water Cleanup Goals

C. Interim Response Action Approaches

D. ARAR 40 C.F.R. § 300.430(e)(2)(i)(A)

E. Application of Surface Water Standards to Nonpoint Sources of Pollutants

ATTACHMENT B

Adjustments to Ground Water Cleanup Goals

Under point 2(c) of the Approach of the Minnesota Superfund Program to Ground Water Cleanup, ground water cleanup goals are set to such a level that residual ground water contaminants do not pose an unacceptable risk, considering a site-specific assessment of risk to the public health, welfare and the environment. 40 C.F.R. § 300.430(e)(2)(i). Based upon the findings of a site-specified risk assessment and feasibility study, departure from the usual approach in setting ground water cleanup goals may be reasonable and appropriate. The amount to adjust a ground water cleanup goal depends to a great extent on site specific factors. In past ground water cleanup decisions, the MPCA has generally set cleanup goals at the Minnesota Department of Health recommended allowable limits (RALs), and at a 1 in 100,000 (10^{-5}) cumulative carcinogenic risk when multiple carinogens are present.

Establishing ground water cleanup goals under the alternative approach of point 2(c) is considered appropriate in the following three cases:

1. Where contaminated ground water is non-migrating, not connected to other ground water and is of inadequate capacity to meet the needs of an average household (i.e., limited capacity non-aquifers). 40 C.F.R. § 264.525(d)(2)(ii).

2. Where ambient ground water quality of the contaminated aquifer in its natural state already restricts ground water use, the natural level may be used as a cleanup goal. Minn. Rules pt. 7060.0600, subp. 8 (1989).

3. Where remediation to drinking water levels is not practicable, 40 C.F.R. § 300.430(f)(1)(ii)(C)(3), provided that the state requirements of maximizing "the possibility of rehabilitating degraded waters for their priority use," Minn. Rules pt. 7060.0400 (1989), and the degradation prevention policy, Minn. Rules pt. 7060.0500 (1989), are compiled with.

Additionally, the proposed adjustments must be reviewed and approved by the Water Quality Division for compliance with the anti-degradation provisions of Minn. Rules pts. 7050.0180 and 7050.0185, and with the general water quality standards of Minn. Rules pt. 7050.0220.

ATTACHMENT C

Interim Response Action Approaches

The Superfund remedial investigation and remedy selection process generally requires two or more years to complete. Until a final remedy can be selected, interim response actions (IRAs) should be implemented to minimize ground water degradation and contain ground water contamination. 40 C.F.R. § 300.430(a)(ii)(B).

Many ground water IRAs involve provision of alternative water supply or water treatment. Other IRAs to address ground water quality involve containment technologies. Generally, containment IRAs are proven technologies which can be quickly designed and implemented. Although it is recognized that ground water containment technologies may achieve a level of ground water cleanup, the primary purpose of implementing containment technologies is to minimize migration of contaminated ground water.

Ground water IRAs are best evaluated and implemented early in the Remedial Investigation/Feasibility Study (RI/FS) process. Ground water IRAs are particularly appropriate at sites where residential water supplies or other receptors are threatened, where the plume is fairly mobile, where deeper aquifers are threatened, where surface waters are impacted or threatened, or where immediate source control is not feasible.

Ground water containment boundaries are set as close to the source(s) as feasible. The area beyond and downgradient of the containment boundary is termed the "area of attainment." Where ground water within the area of attainment is contaminated, appropriate ground water cleanup goals are assigned at the boundaries to mitigate impacts beyond the boundaries.

Ground water containment systems and areas of attainment are monitored for ground water elevation and for ground water quality to verify the effectiveness of the IRA.

ATTACHMENT D

Applicable or Relevant and Appropriate Requirements

The National Contingency Plan provides that:

> [R]emediation goals shall establish acceptable exposure levels that are protective of human health and the environment and shall be developed by considering the following:
>
> (A) Applicable or relevant and appropriate requirements under federal environmental or state environmental or facility siting laws, if available, and the following factors:
>
> (1) For systemic toxicants, acceptable exposure levels shall represent concentration levels to which the human population, including sensitive subgroups, may be exposed without adverse effect during a lifetime or part of a lifetime, incorporating an adequate margin of safety;
>
> (2) For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response. The 10^{-6} risk level shall be used as the point of departure for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure;
>
> (3) Factors related to technical limitations such as detection/quantification limits for contaminants;
>
> (4) Factors related to uncertainty; and
>
> (5) Other pertinent information.

40 C.F.R. § 300.430(e)(2)(i)(a).

ATTACHMENT E

Application of Surface Water Standards to Nonpoint Sources of Pollutants

The following describes the approach of the MPCA in applying surface water standards to nonpoint sources of pollutants. This approach applies to surface waters, and protects the fisheries, recreational uses, and other usually less sensitive uses made of these waters.

Both federal law and state rules require that water quality standards be met. Minn. Rules ch. 7050 requires that designated uses be maintained by controlling point and nonpoint sources of pollutants. The Clean Water Act Amendments of 1987 address pollutants that could reasonably be expected to interfere with the designated uses. Specifically, Section 303(c)(2)(B) of the Clean Water Act provides that all states:

> . . . shall adopt criteria for all toxic pollutants listed pursuant to Section 307(a)(1) of this Act for which criteria have been published under Section 304(a), the discharge or presence of which in the affected waters could reasonably be expected to interfere with those designated uses adopted by the state, as necessary to support such designated uses. Such criteria shall be specific numerical criteria for such toxic pollutants.

Questions have been raised regarding the application of water quality standards to nonpoint sources of toxics, such as surface water run-off or ground water flow. Figure 1. is a cross-section identifying surface and ground water flows from a contaminant site to a surface water. Point A represents a point in a surface water at which water quality standards apply. The water quality standard is the maximum concentration of a pollutant allowable to maintain the designated uses of the waterbody. For rivers and streams, these standards or concentrations, must be met when the stream is at or above its critical flow, the "7Q10." The 7Q10 is the annual average minimum low flow for seven consecutive days with a recurrence interval of ten years. This flow is calculated from historical continuous flow records, or estimated mathematically based on watershed characteristics.

Point B represents the point where contaminated ground water is entering a surface water, and where surface water standards that protect aquatic life and their uses must be considered. This is done by calculating the concentration allowable taking into consideration dilution and the water quality standard. Independent of dilution, the concentration at point B cannot be acutely toxic, because Minnesota rules establish that no point in the mixing zone shall an acutely toxic condition exist. Point C represents the concentration in the ground water below a contamination site. At this point, either standards or cleanup requirements which also protect the ground water as a source of potable water supply using Minnesota Department of Health recommended allowable limits or U.S. Environmental Protection Agency maximum contaminant levels or the nondegradation prevention standard would be applied.

Each site involving the potential for the pollution of surface water from inflow of contaminated ground water must be evaluated individually. Factors such as the degradation of pollutants, dilution by clean ground water, attenuation of pollutants through soil absorption, etc., will differ from one site to another. In all cases, however, the concentration at point B cannot cause an exceedance in the surface water quality standard.

In the case of nonpoint source surface water overland flows from the contaminant site to a surface water, the same approach for establishing compliance with the water quality standard at point A would apply.

In conclusion, the water quality standard protects the designated uses from the presence of toxic pollutants regardless of the source or the pathway of that pollutant to the receiving waterbody.

Figure 1

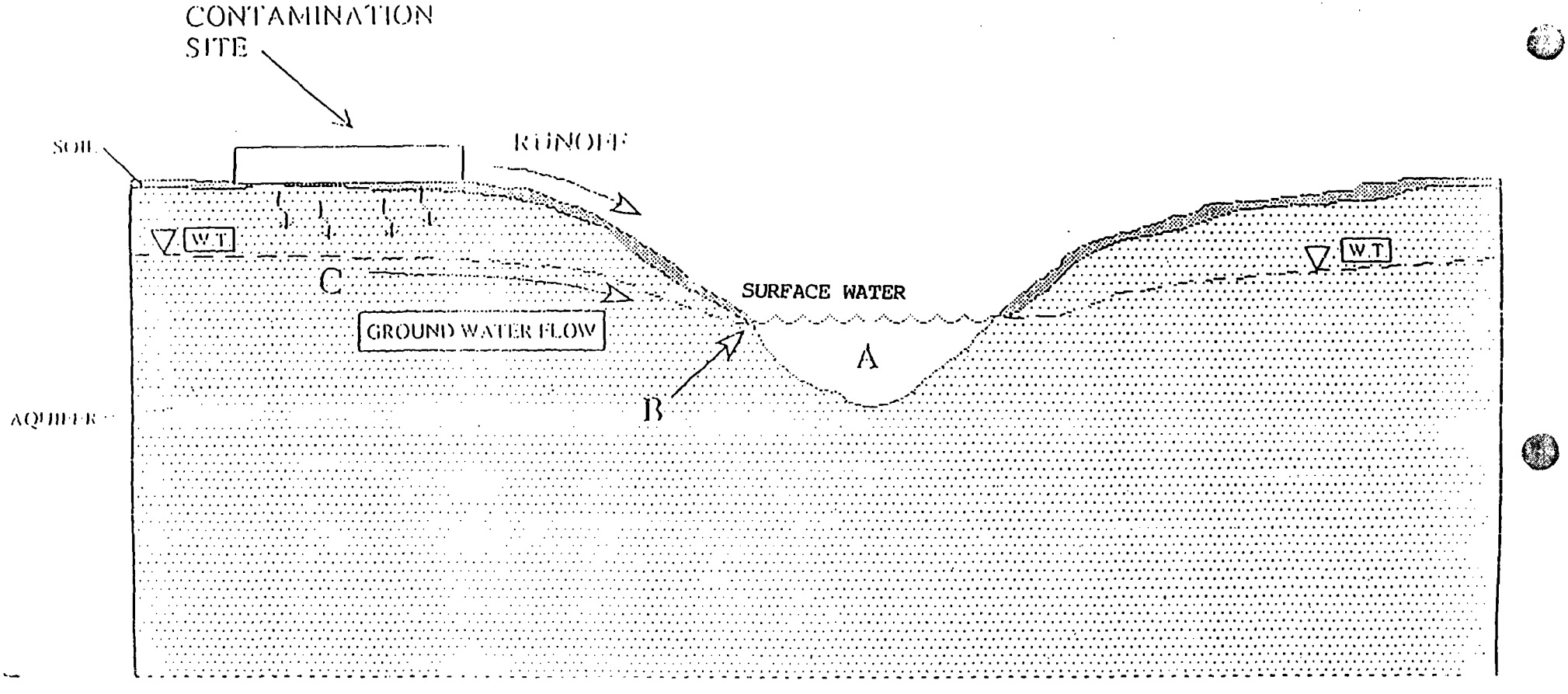
CONTAMINATION SITE
SOIL
RUNOFF
W.T
C
GROUND WATER FLOW
SURFACE WATER
A
B
AQUIFER
W.T

EXHIBIT B
Table of Contents

Exhibit B

REMEDIAL DESIGN AND RESPONSE ACTION IMPLEMENTATION

I. INTRODUCTION

Part II.B. of the Request for Response Action (RFRA), to which this Exhibit is appended, requests the Responsible Party (RP) to prepare a Remedial Design/Response Action Plan (RD/RA Plan) and implement Response Actions (RAs) at the Site. This Exhibit sets forth the requirements for preparing the RD/RA Plan and implementing the RAs, which have been selected by the Minnesota Pollution Control Agency (MPCA) Commissioner pursuant to Part IV.D. of Exhibit A to the RFRA, and is appended to and made an integral part of the RFRA.

II. RETAIN CONSULTANT

The RP shall retain a consultant qualified to undertake and complete the requirements of this Exhibit. If the RP retains the same consultant used to complete Exhibit A to the RFRA, the RP shall proceed immediately with preparation of the RD/RA Plan. If the RP chooses to retain a different consultant, the RP shall retain the consultant and notify the MPCA project manager of the name of that consultant within thirty (30) days of notification of approval of the FS Report by the MPCA Commissioner.

III. REMEDIAL DESIGN/RESPONSE ACTION PLAN

III.A. RD/RA Plan Submittal

Within sixty (60) days of notification of approval of the FS Report by the MPCA Commissioner, the RP shall prepare and submit to the MPCA Commissioner for review and approval a RD/RA Plan which shall be based on the approved RI/FS reports and the Record of Decision (ROD) issued by the MPCA Commissioner under Exhibit A to the RFRA.

III.B. RD/RA Plan Contents

The purpose of the RD/RA Plan is to provide a detailed design, an implementation schedule, and a monitoring plan for the RAs specified in the ROD which, upon implementation, will protect the public health and welfare, and the environment from the release or threatened release of hazardous substances, pollutants or contaminants, at or from the Site.

The RD/RA Plan shall set forth in detail the steps necessary to implement the Site remedy specified in ROD. The RD/RA Plan shall include a restatement of the response action objectives and cleanup levels specified in the ROD. The RD/RA Plan shall include, at a minimum, the following:

III.B.1. Remedial Design. The purpose of the remedial design is to specify detailed methods and time schedules for the implementation of the RAs specified in the ROD. This section shall include, at a minimum, the following elements:

- design criteria and rationale;
- a plan view drawing of the overall Site, showing general locations for response action components;
- technical and operational plans and engineering designs for implementation of the response action including plan and cross sectional views for the individual components to be installed or actions to be implemented;
- a description of the types of equipment to be employed, including capacity, size, and materials or construction;
- an operational description of process units or other RA components;
- process flow sheets, including process material (e.g., chemical or activated carbon) consumption rates, and a description of the process;
- a discussion of potential construction problems and respective contingency plans;
- a schedule for implementing the construction phase;
- a Site-specific hazardous waste transportation plan (if necessary);
- the identity of all contractors, transporters, or other persons conducting removal or response actions at the Site;
- a description of any permits or licenses required to implement the RA;
- a description of the post RA operation and maintenance procedures and schedules; and
- a description of activities to be undertaken by the RPs during RA implementation to fulfill the requirements of Part III, Sections C.1. (Project Management), C.3. (Sampling and Investigations), C.5. (Record Retention), C.8. (Site Security and Safety Plan), and C.9. (Community Relations) of Exhibit A to the RFRA as they pertain to the removal or response actions and operation and maintenance activities.

III.B.2. RA Monitoring Plan. The RD/RA Plan, shall propose an RA monitoring plan for the Site. The purpose of post RA implementation monitoring is to determine the status and effectiveness of the implemented RAs. The RA monitoring plan shall, at a minimum, contain the following in order to determine that the cleanup levels specified in the ROD are achieved:

III.B.2.a. Environmental Media and Analytical Parameter List. The environmental media (soil, ground water, surface water and air) and a corresponding list of analytes to be monitored shall be proposed, along with the selection rationale, and a corresponding list of chemical analytical methodologies (including EPA or Standard Method numbers and detection limits) to be performed.

III.B.2.b. Monitoring Facility Location and Design. The design and location of all monitoring facilities/locations shall be proposed.

III.B.2.c. Sampling Schedule. A sampling schedule for the analytical parameters proposed in the RA monitoring plan for all monitoring locations shall be proposed. Sampling shall, at a minimum, be conducted on a quarterly basis.

III.B.2.d. Reporting Plan. A schedule for reporting the results of long-term monitoring to the MPCA shall be proposed. The schedule shall, at a minimum, contain the following:

1. Quarterly Monitoring Reports. The RP shall submit analytical results to the MPCA Commissioner quarterly by [**specify date**] following the sampling completed during the previous quarter.

2. Annual Monitoring Reports. The RP shall submit an Annual Monitoring Report to the MPCA Commissioner on or before January 1, [**year**] and each January 1 thereafter. Any remedial technology employed in implementation of the RD/RA Plan shall be left in place and operated by the RP until the MPCA Commissioner authorizes the RP in writing to discontinue, move, or modify some or all of the remedial technology. The RP may request discontinuation of the remedial technologies in the annual report, when the cleanup levels set forth in the ROD have been achieved. The RP shall move or modify the remedial technology when the movement or modifications, as approved by the MPCA Commissioner, may better achieve the remedial action objectives set forth in the ROD.

The Annual Monitoring Report shall contain the following:

- a Site map showing all monitoring locations;
- the results of all parameter analyses for the previous year;
- the results of all water level measurements for the previous year;
- regional and Site specific ground water piezometric maps for each aquifer including surface water elevations;
- cross section(s) indicating relative communication between aquifers;
- a map for each sampling event showing each monitoring location with contaminant concentrations and isoconcentration lines for selected parameters;

- graphs and tables illustrating the concentrations over time using data from each sampling event (these graphs and tables shall be cumulative showing parameter analyses for all previous years as well as the reporting year); and

- a sampling plan for the next year with an assessment of the monitoring parameters, sampling frequencies, and the need for the addition or deletion of monitoring locations and parameters.

III.C. **RD/RA Plan Implementation**

Within thirty (30) days of the MPCA Commissioner approval of the RD/RA plan, the RP shall initiate the RA. The purpose of RA implementation is to take those actions which will protect the public health and welfare, and the environment from the release or threatened release of hazardous substances or pollutants or contaminants at or from the Site.

The RD/RA Plan, as approved or modified by the MPCA Commissioner shall be implemented in accordance with the time schedules set forth in Part III of the RFRA and Part III.B. of this Exhibit. The implementation of RAs shall be conducted in accordance with all applicable federal and state ARARs, and local laws, rules, regulations, and ordinances.

During implementation of the RD/RA Plan, the MPCA Commissioner may specify such additions and/or revisions to the RD/RA Plan as the Commissioner deems necessary to protect public health and welfare, and the environment.

III.D. **RA Implementation Report**

Within sixty (60) days of the completion of implementation of the RAs specified in the approved RD/RA Plan, a RA Implementation Report which includes the following elements, shall be submitted to the MPCA Commissioner:

- the data and results of the RA implementation;

- the follow-up actions, if any, to be taken in the following one year period;

- a certification that all work plans, specifications, and schedules have been implemented and completed in accordance with the RD/RA Plan as approved or modified by the MPCA Commissioner;

- discussion of difficulties encountered during the implementation that may alter and/or impair or otherwise reduce the effectiveness of the RA implementation to prevent, eliminate, or minimize the release or threatened release of hazardous substances or pollutants or contaminants, at or from the Site, or which may require unanticipated operational or maintenance actions to maintain the effectiveness of any of the implemented RAs; and

° a discussion of any necessary modifications to the operation and maintenance procedures as approved.

IV. **REPORT ON COMPLETION OF RA**

Within sixty (60) days of notification, by the MPCA Commissioner, that all Site-specific Response Action Objectives and Cleanup Levels (Exhibit A, Part IV.A.) have been met, a **Report on Completion of RA,** which includes the following elements, **shall be submitted to the MPCA Commissioner.**

° a summary of the response action objectives and cleanup levels and a history of how they were met;

° certification that all RAs have been properly dismantled, including supporting documentation (e.g., monitoring well abandonment logs);

° a summary of any ongoing institutional controls (e.g., deed restrictions);

° a final cost summary.

V. **MPCA COMMISSIONER ACTIONS**

The RP shall submit to the MPCA Commissioner all plans, reports, or other documents (submittals) required by this Exhibit. The review and approval, approval with modifications and/or a request for additional information, or rejection of submittals shall be in accordance with this section and Part IV of the RFRA. The Site Safety and Security Plan does not require MPCA Commissioner approval.

V.A. <u>Approval Of The RD/RA Plan, RA Implementation Report, And Report On Completion Of RA</u>

The MPCA Commissioner shall review and approve, approve with modifications and/or a request for additional information, or reject the RD/RA Plan, RA Implementation Report, and the Report on Completion of RA based on the requirements of Parts III.B, III.D, and IV respectively. Modifications by the MPCA Commissioner are final.

If the MPCA Commissioner approves the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA with a requirement to provide additional information, the Commissioner will: 1) specify the deficiencies in the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA that necessitate the need for additional information; 2) provide direction to address the deficiencies; 3) specify the manner in which the RP shall document or otherwise convey the additional information; and 4) specify the time frame for submission or conveyance of the requested additional information.

If the MPCA Commissioner rejects the RD/RA Plan, RA Implementation Report, or the Report on Completion of RA, the Commissioner will: 1) specify the deficiencies in the RD/RA Plan, RA Implementation Report, or Completion of RA Report that necessitate the rejection; 2) provide direction to address the deficiencies; 3) specify the manner in which the RP shall document or otherwise convey the information necessary to correct the deficiencies; and 4) specify the time frame for submission or conveyance of the information necessary to correct the deficiencies.

Figure 1A: The Minnesota Superfund Process

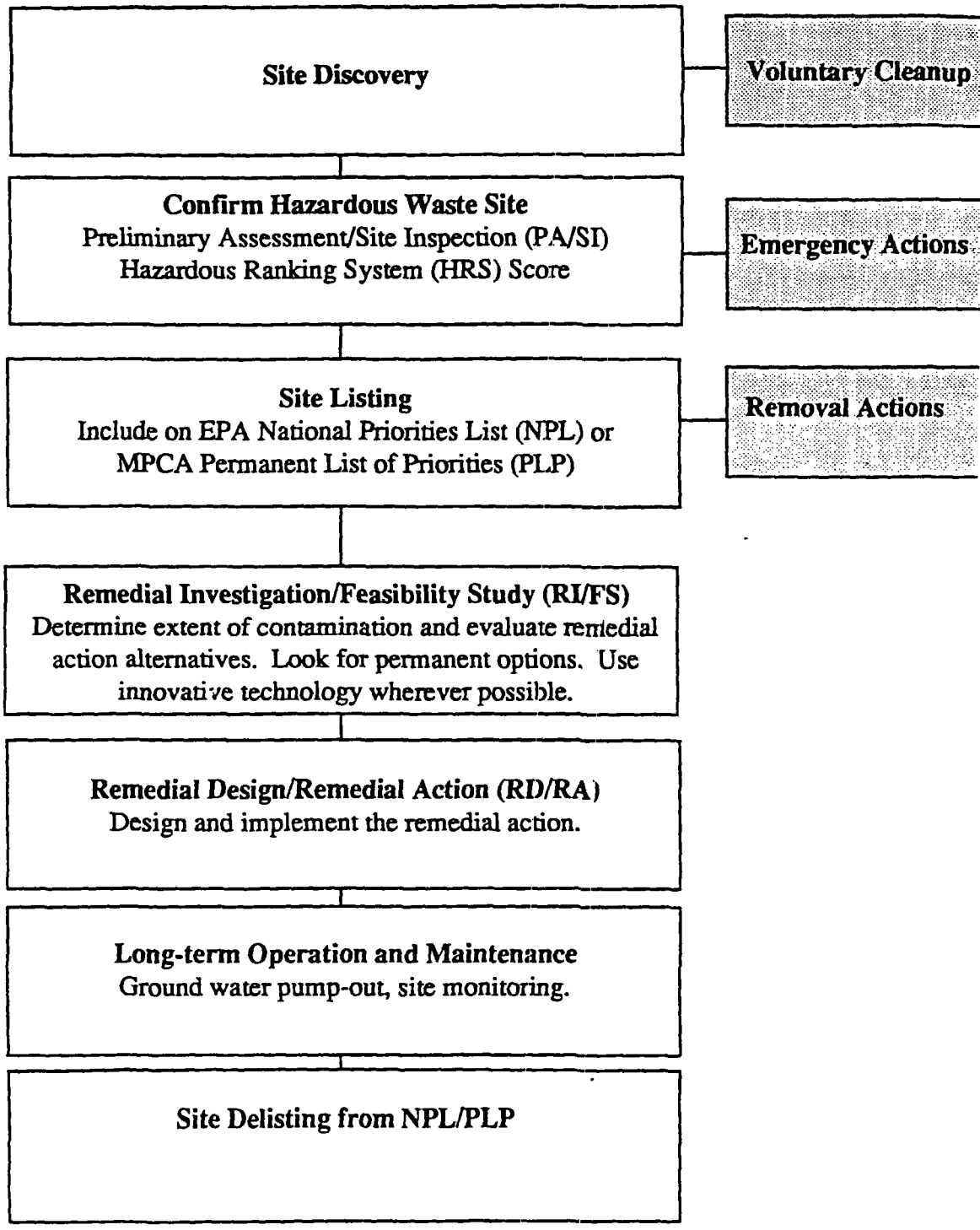

Figure 1B: MPCA Administrative/Enforcement Process under MERLA